



[6450-01-P]

DEPARTMENT OF ENERGY

10 CFR Parts 433 and 435

[Docket No. EERE-2010-BT-STD-0031]

RIN 1904-AB96

Fossil Fuel-Generated Energy Consumption Reduction for New Federal Buildings and Major Renovations of Federal Buildings

AGENCY: Office of Energy Efficiency and Renewable Energy, Department of Energy.

ACTION: Supplemental notice of proposed rulemaking.

SUMMARY: The Energy Conservation and Production Act (ECPA), as amended by the Energy Independence and Security Act of 2007, requires DOE to establish revised performance standards for the construction of new Federal buildings, including commercial buildings, multi-family high-rise residential buildings and low-rise residential buildings. On October 15, 2010, DOE issued a Notice of Proposed Rulemaking (NPR) to establish regulations implementing the fossil fuel-generated energy provisions of the ECPA performance standards for Federal buildings. In response to the NPR, DOE received a number of comments expressing concern and encouraging DOE to re-examine the proposed regulations. In response to these comments, DOE has identified additional areas for clarification and consideration that would benefit from

further public comment. In this supplemental notice of proposed rulemaking (SNOPR), DOE responds to the comments received on the NOPR and identifies and seeks comment on additional approaches to the scope of the requirements in the context of major renovations, the potential use of renewable energy certificates for compliance, and a streamlined process for agencies to seek a downward adjustment from the required reduction levels, particularly for major renovations.

DATES: Public comments on this supplemental proposed rule will be accepted until **[INSERT DATE 60 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]**.

ADDRESSES: This rulemaking can be identified by docket number EERE-2010-BT-STD-0031 and/or RIN number 1904-AB96.

Docket: The docket is available for review at <http://www.regulations.gov> including Federal Register Notices, public meeting attendee lists, transcripts, comments and other supporting documents/materials. All documents in the docket are listed in the <http://www.regulations.gov> index.

You may submit comments, identified by any of the following methods:

- Federal eRulemaking Portal: <http://www.regulations.gov>. Follow the instructions for submitting comments.
- E-mail: FossilFuelReduct-2010-STD-0031@ee.doe.gov. Include EERE-2010-BT-STD-0031 and/or RIN 1904-AB96 in the subject line of the message.
- Postal Mail: Ms. Brenda Edwards, U.S. Department of Energy, Building Technologies Program, Mailstop EE-2J, Fossil Fuel-Generated Energy Consumption Reduction for New Federal Buildings and Major Renovations of Federal Buildings, EERE-2010-BT-STD-0031 and/or RIN 1904-AB96, 1000 Independence Avenue, SW., Washington, DC

20585-0121. Telephone: (202) 586-9138. Please submit one signed paper original. Due to the potential delays in DOE's receipt and processing of mail sent through the U.S.

Postal Service, DOE encourages respondents to submit comments electronically to ensure timely receipt.

- Hand Delivery/Courier: Brenda Edwards, U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Building Technologies Program, EE-2J, 1000 Independence Avenue, SW., Washington, DC 20585-0121.

Instructions: All submissions must include the agency name and docket number or Regulatory Information Number (RIN) for this rulemaking.

Docket: For access to the docket to read background documents or comments received by DOE, go to the U.S. Department of Energy, Forrestal Building, Room 5E-080 (Resource Room of the Federal Energy Management Program), 1000 Independence Avenue, SW., Washington, DC, (202) 586-9127, between 9 a.m. and 4 p.m., Monday through Friday, except Federal holidays. Please call Brenda Edwards at (202) 586-2945 for additional information regarding visiting the Resource Room.

FOR FURTHER INFORMATION CONTACT: For technical issues, contact Sarah Jensen, U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Building Technologies Program, EE-5F, 1000 Independence Avenue, SW., Washington, DC 20585-0121, (202) 287-6033, e-mail: Sarah.Jensen @ee.doe.gov. For legal issues, contact Ami Grace-Tardy, U.S. Department of Energy, Office of the General Counsel, Forrestal Building, GC-71, 1000 Independence Avenue, SW., Washington, DC 20585, (202) 586-5709, e-mail: Ami.Grace-Tardy@hq.doe.gov.

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I. Introduction

A. Authority

Section 305 of the Energy Conservation and Production Act (ECPA) established energy conservation requirements for Federal buildings. (42 U.S.C. 6834) Section 433(a) of the Energy Independence and Security Act of 2007 (Pub. L. 110-140) (EISA 2007) amended section 305 of ECPA and directed DOE to establish regulations that require fossil fuel-generated energy consumption reductions for certain new Federal buildings and Federal buildings undergoing major renovations. (42 U.S.C. 6834(a)(3)(D)(i)) The fossil-fuel generated energy consumption reductions only apply to Federal buildings that: (1) are “public buildings” (as defined in 40 U.S.C. 3301)¹ with respect to which the Administrator of General Services is required to

¹ Under 40 U.S.C. 3301(5), "public building" is a building, whether for single or multitenant occupancy, and its grounds, approaches, and appurtenances, which is generally suitable for use as office or storage space or both by one or more Federal agencies or mixed-ownership Government corporations.

"Public building" includes Federal office buildings, post offices, customhouses, courthouses, appraisers stores, border inspection facilities, warehouses, record centers, relocation facilities, telecommuting centers, similar Federal facilities, and any other buildings or construction projects the inclusion of which the President considers to be justified in the public interest.

The definition does not include a building or construction project that is on the public domain (including that reserved for national forests and other purposes); that is on property of the Government in foreign countries; that is

transmit a prospectus to Congress under 40 U.S.C. 3307²; or (2) those that cost at least \$2,500,000 in costs adjusted annually for inflation. (42 U.S.C. 6834(a)(3)(D)(i))

For these buildings, Section 305 of ECPA, as amended by EISA 2007, mandates that the buildings be designed so that a building's fossil fuel-generated energy consumption is reduced as compared with such energy consumption by a similar building in fiscal year 2003 (as measured by Commercial Buildings Energy Consumption Survey or Residential Energy Consumption Survey data from the DOE's Energy Information Administration) by 55 percent beginning in fiscal year 2010, 65 percent beginning in fiscal year 2015, 80 percent beginning in fiscal year 2020, 90 percent beginning in fiscal year 2025, and 100 percent beginning in fiscal year 2030. (42 U.S.C. 6834(a)(3)(D)(i)(I))

In addition, upon petition by an agency subject to the statutory requirements, ECPA, as amended by EISA 2007, permits DOE to adjust the applicable numeric reduction requirement downward with respect to a specific building, if the head of the agency designing the building certifies in writing that meeting such requirement would be technically impracticable in light of the agency's specified functional needs for that building and DOE concurs with the agency's conclusion. (42 U.S.C. 6834(a)(3)(D)(i)(II)) Such an adjustment does not apply to GSA. (42

on Indian and native Eskimo property held in trust by the Government; that is on land used in connection with Federal programs for agricultural, recreational, and conservation purposes, including research in connection with the programs; that is on or used in connection with river, harbor, flood control, reclamation or power projects, for chemical manufacturing or development projects, or for nuclear production, research, or development projects; that is on or used in connection with housing and residential projects; that is on military installations (including any fort, camp, post, naval training station, airfield, proving ground, military supply depot, military school, or any similar facility of the Department of Defense); that is on installations of the Department of Veterans Affairs used for hospital or domiciliary purposes; or the exclusion of which the President considers to be justified in the public interest.

² 40 U.S.C. 3307 describes the minimum construction, alteration and lease costs that would trigger a prospectus to Congress.

U.S.C. 6834(a)(3)(D)(i)(II)) (In the remainder of today’s rulemaking, all references to ECPA refer to the statute as amended through EISA 2007.)

B. Background

This supplemental notice of proposed rulemaking amends certain portions of 10 CFR parts 433 and 435, the regulations governing energy efficiency in Federal buildings. The Notice of Proposed Rulemaking (NPR) was published on October 15, 2010. 75 FR 63404. The public meeting was held on November 12, 2010, and public comments were accepted through December 14, 2010. DOE received a number of comments expressing concern and encouraging DOE to re-examine the proposed regulations³. In response to these comments, DOE has identified additional areas for clarification and consideration that would benefit from further public comment. In this SNOPR, DOE responds to the comments received on the NPR and identifies and seeks comment on additional approaches to the scope of the requirements in the context of major renovations, the potential use of renewable energy certificates for compliance, and a more streamlined process for agencies to seek a downward adjustment from the reduction levels.

DOE is in the process of addressing other requirements for Federal buildings mandated in ECPA, as amended by section 433 of EISA. DOE published a proposed rule on sustainable design standards for new Federal buildings and major renovations on May 28, 2010 (75 FR 29933) (the “Sustainable Design NPR”), which also proposed to amend certain portions of 10

³ Complete contents of the docket folder may be found at <http://www.regulations.gov/#!docketDetail;D=EERE-2010-BT-STD-0031>.

CFR parts 433 and 435. (Docket No. EE-RM/STD-02-112, RIN 1904-AC13) Elsewhere in this issue of the **Federal Register**, the green building certification portion of the Sustainable Design NOPR is published as a final rule.

DOE received a number of comments on the scope of the EISA 2007 amendments both in the context of this rulemaking and in response to the Sustainable Design NOPR. DOE addresses both sets of comments in today's rulemaking.

II. Summary of the Proposed Rule

This SNOPR addresses requirements for new construction and major renovations of Federal commercial and high-rise residential buildings, as well as Federal low-rise residential buildings. The following is an overview of each section of today's SNOPR, including any relevant changes from the proposal as provided in the October 15, 2010 NOPR. (75 FR 63404; "2010 Proposed Rule")

A. Regulatory Scheme

In this SNOPR, DOE is proposing to address the contents of Subpart B of both 10 CFR parts 433 and 435 – the fossil fuel-generated energy consumption requirements.

In addition, this rule proposes to amend the term "life-cycle cost-effective" to tie the definition of life-cycle cost-effectiveness closer to the four life cycle cost methodologies set out in subpart A of 10 CFR part 436.

B. Overall Basis for the Rulemaking

The underlying requirements for this rulemaking are based on the requirements in Section 433 of EISA 2007. The statute requires that covered Federal buildings be designed so that the fossil fuel-generated energy consumption of the buildings is reduced, as compared with such energy consumption by a similar building in fiscal year 2003 (as measured by Commercial Buildings Energy Consumption Survey or Residential Energy Consumption Survey data from DOE’s Energy Information Administration), by the percentage specified in the following table:

Fiscal Year Percentage Reduction	
2010	55
2015	65
2020	80
2025	90
2030	100.

As discussed later in this document, DOE believes that the current energy efficiency requirements applicable to the design of new Federal buildings, when compared to the energy efficiency of the baseline buildings, would result in a substantial level of compliance with the 55 percent and 65 percent reduction levels.

C. Covered Buildings

The proposed rule would apply to certain new Federal buildings, and major renovations to Federal buildings, as specified in section 433 of EISA 2007. By statute, the term “Federal building” means any building to be constructed by, or for the use of, any Federal agency, including buildings built for the purpose of being leased by a Federal agency, and privatized military housing. (42 U.S.C. 6832(6))

This proposed rule only would apply to new Federal buildings and major renovations to Federal buildings covered by EISA 2007. Federal buildings covered by EISA 2007 include new Federal buildings, or major renovations to Federal buildings, that are also: (1) public buildings, as defined in 40 U.S.C. 3301 for which a transmittal of a prospectus to Congress is required under 40 U.S.C. 3307; or (2) Federal buildings for which the construction cost or major renovation cost is at least \$2,500,000 (2007 dollars, adjusted for inflation). This subset of buildings and major renovations will be referred to as EISA-covered buildings in this SNOPR.

D. Definitions

This rulemaking contains definitions for “combined heat and power (CHP) system,” “district energy system,” “fiscal year,” “major renovation,” “power purchase agreement (PPA),” “proposed building,” and “renewable energy certificate.”

This rulemaking also proposes to define 16 categories of commercial buildings and one category of multi-family high-rise residential buildings in 10 CFR part 433 and one category of low-rise residential buildings in 10 CFR part 435. The 16 categories of commercial buildings

proposed are education, food sales, food service, health care (inpatient), health care (outpatient), laboratory, lodging, mercantile (enclosed and strip shopping malls), office, public assembly, public order and safety, religious worship, retail (other than mall), service, and warehouse and storage. Many of these commercial building categories are further divided into building types. The single category of low-rise residential buildings is divided into five building/activity types: manufactured homes, multi-family in 2-4 unit buildings, multi-family in 5 or more unit buildings, single-family attached, and single-family detached. These building categories and building types represent the high-level principal building activity and low-level principle building activity categories in the 2003 Commercial Building Energy Consumption Survey (CBECS).⁴

E. Fossil Fuel-Generated Energy Consumption Requirements

For buildings for which design for construction begins in the fiscal years 2013 to 2029, tables of the proposed maximum allowable fossil fuel-generated energy consumption by building type and climate zone are provided. The proposed values in the tables come from DOE's Energy Information Administration (EIA) CBECS (for commercial buildings) and RECS (for multi-family high-rise and low-rise residential buildings), both of which are converted from site energy consumption to source energy consumption. The building types in the tables in Appendix A to this proposed rule are subsets of the building categories discussed above.

⁴ The CBECS principle building types and subcategories are described at <http://www.eia.gov/consumption/commercial/building-type-definitions.cfm>. This rulemaking is based on the subcategories shown in this link.

The CBECS and RECS data was parsed into the 16 climate zones used in the current Federal baseline standards for commercial and multi-family high-rise residential buildings, which rely on ANSI/ASHRAE/IESNA Standard 90.1.

For buildings that combine two or more building types, area-weighted averaging by square footage for each building type would be used to calculate the maximum allowable fossil fuel-generated energy consumption of the combined building. For building types dominated by process loads, as defined in 10 CFR 433.2, and that are not listed in CBECS, the regulations would require the use of the CBECS building type that most closely matches the building without the process load and then accounting for the process load in the calculation. For these buildings, process loads would be accounted for, but are not subject to the percentage reductions in fossil fuel-generated energy consumption required for the building related loads.

For major renovations that are less than whole building renovations (system or component level retrofits) DOE is proposing that the maximum allowable fossil fuel-generated energy consumption in fiscal years 2013 through 2029 be based on a percentage of the whole building energy consumption represented by the renovated system or component.

For buildings for which design for construction begins in fiscal year 2030 or beyond, the fossil fuel-generated energy consumption of the building would be required to be zero for all building types and climate zones, based on the calculation established in the regulations.

F. Fossil Fuel-Generated Energy Consumption Determination

To determine compliance with the fossil fuel reductions, agencies would be required to estimate the fossil fuel-generated energy consumption of their proposed building design and compare that estimate to the allowable fiscal year percentage reduction target. DOE has proposed a calculation to make this estimated fossil fuel-generated energy consumption for the proposed building.

Fundamentally, the calculation would add the fossil fuel component of the electricity used by the building to the direct fossil fuels used by the building. To calculate the fossil fuel component of the electricity used by the building, agencies would be required to first estimate the amount of electricity used by the building in accordance with the Performance Rating Method in Appendix G of ASHRAE Standard 90.1-2010. Any electricity produced from a renewable energy or CHP system would not count towards the site electricity consumption in the baseline or the current calculated level. This figure would then be multiplied by the fossil fuel generation factor (calculated at 0.71 for the 2003 base year and also for 2012, the latest year of data available from EIA) to account for the percentage of electricity in the U.S. that is generated from fossil fuel.⁵ FEMP will publish updates to the fossil fuel generation factor annually on the FEMP website⁶ so that agencies can use the most recent value in their calculations. The adjusted site electricity estimate would then be converted to source electricity by dividing it by the national average electricity source energy factor of 0.316 to account for fuel conversion and transmission and

⁵ The fossil fuel generation factor of 0.71 is derived from Table 3.2.A of the Energy Information Administration (EIA) 2012 Electric Power Annual Report (http://www.eia.gov/electricity/annual/html/epa_03_02_a.html). Specifically, the number is developed by summing the annual electricity produced by coal, petroleum liquids, petroleum coke, natural gas, and other gas and then dividing the sum by the total electricity produced. 0.71 is the value of this factor in 2003 and in 2012, but the value has changed over time and is expected to vary in the future as new sources of renewable energy come online.

⁶ <http://energy.gov/eere/femp/federal-energy-management-program>

distribution losses. To this would be added the direct fossil fuel consumption for fuels other than electricity, adjusted for distribution and other losses that occur between delivery to the fuel provider and final delivery to the site with the other fuels source energy multiplier. The other fuels energy source multiplier would not include losses associated with the production, harvesting, refining, or transportation of bulk fuels. The result would then be divided by the floor area of the building and converted to thousands of British thermal units per square foot (kBtu/sq.ft.)

For major renovations that are less than whole building renovations (system or component level retrofits) DOE proposes to base the subject fossil fuel-generated energy consumption on the system or component as retrofitted.

Electricity produced from renewable energy would qualify as a deduction to the extent that it represents new electric generating capacity or a new renewable energy obligation on the part of the agency, and not a reassignment of existing capacity or obligations. The regulations would establish criteria for on-site renewable electricity generation and off-site renewable electricity generation (including generation represented by Renewable Energy Certificates) to help clarify these terms and the limits on how this generation may be used as a deduction from the proposed building electricity consumption. DOE has also proposed a clarification as to how electricity associated with district heating or cooling systems, district chilled water, and CHP systems would be treated.

G. Petitions for Downward Adjustment

Under the provision of Section 433 of EISA 2007 and as proposed, agencies other than GSA (but including GSA-tenant agencies with significant control over building design) would be able to petition DOE for an adjustment to the fossil fuel requirement with respect to a specific building if meeting the requirement is technically impracticable in light of the agency's functional needs for the building. This proposed rule provides a list of what information would be required to be included in a petition for a downward adjust for a new building. This includes a description of the building and associated components and equipment, an explanation of why compliance with the requirements is technically impracticable in light of the functional needs of the building, a demonstration that all cost-effective energy efficiency and on-site renewable energy measures were included in the building design, and a description of measures that were evaluated but rejected. As proposed, the Director of the Federal Energy Management Program would review the petition and make a decision on the petition within 90 days of submittal.

Additionally, this rulemaking proposes separate, streamlined downward adjustment processes for major renovations that are whole building renovations and for major renovations that are system or component level retrofits. The streamlined processes recognize the constraints on compliance inherent with major renovations, e.g., building site and orientation cannot be changed and configuration of the building shell is likely difficult, if not technically impracticable, to adjust. Under DOE's proposal, upon application, a Federal agency with a major renovation that is a whole building renovation would receive a downward adjustment equal to the energy efficiency level that would be required under the Federal building energy efficiency standards were the building a new building (i.e., the ASHRAE 90.1 and IECC

requirements applicable to commercial and residential new Federal buildings, respectively).

Upon application, a major renovation that is limited to a system or component level retrofit would receive a downward adjustment equal to the energy efficiency level that would be achieved through the use of products that represent a level of energy efficiency that is life-cycle cost-effective if such products are commercially available. This would be demonstrated through the use of ENERGY STAR or FEMP-designated products, or products that meet the applicable prescriptive requirements under ASHRAE 90.1 or the IECC.

H. Summary of the Differences between the 2010 Proposed Rule and this Proposed Rule

In this proposed rule, the Department makes a number of substantial changes from the 2010 proposed rule. The changes apply to both 10 CFR part 433 and 10 CFR part 435 unless otherwise noted. Details of these changes with a discussion of each are described in Section III. This proposed rule would:

- Add definitions for combined heat and power (CHP) system, proposed building, proposed building site electricity consumption, direct fossil fuel consumption of proposed building, district energy system, electricity source energy factor, fiscal year, floor area, fossil fuel generation factor, other fuels source energy multiplier, power purchase agreement (PPA), renewable energy certificates and renewable energy and CHP electricity deduction.
- Delete definitions for fossil fuel, fossil fuel consumption for electricity generation, and primary electrical energy consumption.

- Amend definitions for direct fossil fuel consumption, district energy system, electricity source energy factor, fossil fuel generation factor, and major renovation.
- Clarify applicability of the rule to major renovations.
- Clarify applicability of the rule to leased facilities.
- Replace the proposed maximum allowable fossil fuel-generated energy consumption tables with new tables adjusted for each of DOE's 16 climate zones and covering additional commercial building types.
- Consider an approach to determine required fossil fuel-generated energy consumption levels for major renovations that are limited to system or component level retrofits.
- Delete the Performance Rating Method in Appendix G of ASHRAE Standard 90-1.2004 and the IECC Simulated Performance Alternative as the means to calculate a baseline for building types not listed in the Commercial Buildings Energy Consumption Survey (CBECS) and the Residential Energy Consumption Survey (RECS), respectively. The expansion of building types would eliminate the need to develop alternative baselines.
- Include an alternative compliance method for buildings with process loads that are not included in CBECS and RECS. Clarifies that process loads of building types not included in CBECS are not subject to the fossil fuel reductions.
- Clarify performance level determination. Modify the calculation methodology and specify the electricity source factor and the fossil fuel generation factor to be used. Add a source energy multiplier for other fuels.
- Specify what qualifies as a renewable energy and CHP deduction, including renewable energy produced off-site by the agency, renewable energy acquired pursuant to a power purchase agreement, Renewable Energy Certificates and a pro-rated share of the

electricity produced from a CHP system. Specify that renewable energy production must be additive, that it must be tracked, and that the renewable energy attributes must be retained.

- Clarify how district heating and cooling systems and combined heat and power systems are to be considered in determining compliance with the fossil fuel reductions.
- Move the discussion of petitions for downward adjustment into its own subsection.
- Allow GSA-tenant agencies to submit a petition for downward adjustment.
- Add information to be included in petitions for downward adjustment for new buildings, including a demonstration that all energy efficiency measures and on-site renewable energy measures that are life-cycle cost-effective have been included in the design; a description of technologies that were evaluated and rejected, including a justification for why they were rejected; and a description of the building and building energy-related features.
- Provide an address to which petitions must be submitted and clarify that DOE would respond to petitions within 90 days.
- Provide streamlined processes for Federal agencies to petition for a downward adjustment for major renovations.

III. General Discussion and Response to Comments

A. Overview

DOE received comments from 22 different entities. In addition, 10,677 form letters were received in a campaign coordinated by Earthjustice, some of which included unique comments (hereinafter referred to collectively as “Form Letters.”)

The comments were analyzed and categorized into six major categories: Applicability, Baseline, Methodology, Impacts, Petition for Downward Adjustment, and Guidance. Each of these major categories was subdivided into at least four subcategories, leading to the final comment categorization shown below.

Applicability: costs to determine \$2.5 million threshold; the effective date of the rule; definition of major renovations; applicability to single or multiple buildings; treatment of leased buildings and mixed use buildings; Federal buildings overseas; residential building categories; privatized military housing; coordination with the DOE rulemaking on sustainable design practices; and other.

Baseline: CBECS and RECS baseline; climate adjustment; whole building simulation; buildings with energy-intensive process loads not covered in CBECS and RECS; plug and process loads; differentiation between fossil fuels; differentiation of electric power mix by region; using the marginal source of electricity; treatment of residential common areas; and other.

Methodology: additional rounds of review of the rule; off-site renewable energy; source versus site energy; on-site energy generation; fuel conversion efficiency; and other.

Impacts: cost impacts and other.

Petition for downward adjustment: bundling of petitions; costs as grounds for a petition; DOE review process; information in petitions; public availability of petitions; stringency of petition requirements; GSA-tenant agencies; and consideration of technical impracticability.

Guidance: training and verification and monitoring.

Most of the issues are the same for both commercial buildings (including multi-family residential buildings four stories or more) and residential buildings. Therefore, the discussion below applies to both building categories unless otherwise noted.

B. Scope and Applicability of the Proposed Rule

This section discusses the scope, or applicability, of the rule as proposed in response to comments received to date. This section provides preliminary responses related to: (1) what costs should be considered when calculating whether a construction project meets the \$2.5 million threshold in EISA 2007; (2) when the rule goes into effect; and (3) which new construction and major renovation projects are covered by today's rule.

1. Determining the \$2.5 Million Threshold for Applicability of the Rule

As noted above, the proposed rule would apply to new Federal buildings and major renovations to Federal buildings that are: (1) “public buildings” as defined by 40 U.S.C. 3301 for which a prospectus to Congress is required under 40 U.S.C. 3307; or (2) buildings with construction or renovation costs of at least \$2.5 million in costs adjusted annually for inflation. (42 U.S.C. 6834(a)(3)(D)(i)) (These buildings are collectively referred to as “EISA-covered buildings” in this SNOPI.) DOE notes that the ECPA definition of “Federal building” was revised by EISA 2007. DOE is addresses this definition and the regulatory definition of “new Federal building” in this rulemaking. ECPA, as amended, defines “Federal building” to mean any building to be constructed by, or for the use of, any Federal agency including buildings built for the purpose of being leased by a Federal agency, and privatized military housing. (42 U.S.C. 6832(6))

DOE requested comments in the NOPR specifically on the definition of construction costs to determine which buildings meet the \$2.5 million threshold and would be subject to the fossil fuel reduction requirements. DOE noted that construction costs generally include design, permitting, construction (materials and labor), and commissioning costs, but that land and legal costs generally would not be included. 75 FR 63406.

The American Gas Association (AGA) and the Department of Health & Human Services-Indian Health Service-Office of Environmental Health, Division of Engineering Services (DHHS-IHS-OEHE) agreed with the proposed definition. (AGA, No. 16 at p. 4⁷; DHHS, No. 24

⁷ Notations of this form appear throughout this document and identify statements made in written comments or at public hearings that DOE has received and has included in the docket for this rulemaking. For example, “AGA, No. 16 at p. 4” refers to a comment: (1) From the American Gas Association; (2) in document number 16 in the docket of this rulemaking; and (3) appearing on page 4 of the submission.

at p. 1) The Edison Electric Institute (EEI) commented that the land and legal costs could be very high, and that all costs should be considered in any analysis. (EEI, No. 10 at p. 2)

DOE preliminarily has decided that land and legal costs would not be included when determining the \$2.5 million threshold. Legal costs are generally part of overhead costs, not construction costs. Concerning land costs, many new Federal buildings are built on land already owned by the Federal government. Moreover, it would be very challenging for agencies to determine the value of the land in these cases where there is no recent land purchase. Not including land costs for new Federal buildings in the threshold calculation would be consistent with the threshold calculation for major renovations, for which land costs are not a concern.

In addition to comments specifically about land and legal costs, AGA and the National Propane Gas Association (NPGA) both questioned whether the cost of compliance with the fossil fuel consumption reductions would be included when determining whether the \$2.5 million applicability threshold is met. (AGA, No. 17 at p. 6; NPGA, No. 23 at p. 3) NPGA also expressed concern that the threshold is too low. (NPGA, No. 23 at p. 3)

DOE believes that it could be difficult to separate the costs of complying with the requirements of this rule from other design and construction costs. Conversely, it may be difficult to calculate the cost of a project including the costs to comply with the fossil fuel reduction requirements in those instances in which an agency would be seeking a downward adjustment. DOE anticipates that design and construction costs for most new Federal buildings, and many renovations to Federal buildings, will exceed \$2.5 million. Therefore, DOE proposes

that the \$2.5 million threshold does not include the cost of complying with the reductions and requests comment on this proposal.

2. Compliance Date of the Rule

The NOPR stated that the requirements would apply to all eligible buildings for which design for construction began at least one year after publication of the final rule. 75 FR 63415. The Department of Defense-Air Force (DOD-AF) asked that the rule apply to projects programmed after the date the rule is final. (DOD-AF, No. 25C at p. 3) The majority of the comments on this issue suggested not delaying the rule. The Natural Resources Defense Council (NRDC) and the Form Letters stated that the rule should be finalized and implemented immediately, and AGA commented that the target reductions should be promulgated as soon as administratively practicable. (NRDC, No. 14 at pp. 13-14; Form letter, No. 29 at p. 1; AGA, No. 16 at p. 2) NRDC commented that the rule is already late, and recommended that “design for construction” be interpreted to mean the initiation of the schematic design phase. (NRDC, No. 14 at pp. 13-14) NRDC also commented that DOE should interpret the fossil fuel-generated reduction tables in EISA 2007 to apply to the date of initial occupancy rather than the date that design begins. (NRDC, No. 14 at p. 15)

DOE proposes to retain the compliance date, tied to the design of the building, as proposed in the NOPR. Federal agencies are familiar with this date as it is consistent with the compliance date that DOE has used for baseline Federal building energy efficiency standards at 10 CFR parts 433 and 435 for several years. Under 10 CFR parts 433 and 435, “design for

construction” means the stage when the energy efficiency and sustainability details (such as insulation levels, HVAC (heating, ventilating, and air-conditioning) systems, water-using systems, etc.) are either explicitly determined or implicitly included in a project cost specification. This proposed rule would add a closely related definition of “proposed building” to tie the “design for construction” definition to the fossil fuel-generated energy consumption determination equation in the rule. A proposed building would be the design for construction of a new Federal commercial, multi-family high-rise residential building, or low-rise residential building, or major renovation to such a building, proposed for construction. This definition was not proposed in the NOPR. DOE intends that the addition of this definition would help clarify terms in the fossil fuel-generated energy consumption determination equation.

3. Major Renovations

ECPA requires that fossil fuel reductions be implemented in “major renovations” to EISA-covered buildings. The Sustainable Design NOPR would define major renovation to include changes to a building that provide significant opportunities for substantial improvement in energy efficiency and renovations of any kind with costs that exceed 25 percent of the replacement value of the building, and requested comments on the definition. 75 FR 29942. Because DOE had assigned the definition to the Sustainable Design Rule with the expectation that it would serve for both rules, DOE did not include the definition in the NOPR for this rule. However, this supplemental proposed fossil fuel-generated reduction rule is now being published prior to a final Sustainable Design rule, so DOE has modified the major renovation definition

proposed in the Sustainable Design rule to align more closely with today's fossil fuel-generated reduction supplemental proposed rule.

Nonetheless, DOE received several comments related to major renovations for this rulemaking. NRDC commented that the scope of the rule should be broadened to apply to all new Federal buildings in order to meet the requirements of EISA 2007. (NRDC, No. 14 at p. 2) The American Public Gas Association (APGA) commented that the 25 percent threshold amount is too low. (APGA, No. 17 at p. 2) Both the Department of Defense-Navy (DOD-N) and DOD-AF recommended that DOE limit the rule to major renovations that cost 50 percent or more of the building replacement value, as that is the definition they use internally for their facilities. (DOD-N, No. 25B at p. 11; DOD-AF, No. 25C at p. 5) DOE also received two comments about renovations spanning more than one year. NRDC commented that DOE must define "construction project costs" to be the total planned or budgeted project costs for the renovation, irrespective of whether the project spans more than one fiscal year or whether the agency has yet to receive full funding. (NRDC, No. 14 at p. 5) APGA commented that by not including renovation activities that potentially could occur in future fiscal years, that energy saving capital-expenditure renovations will be deferred to future fiscal years and could end up producing a negative net energy and greenhouse gas emissions return for renovation dollars expended. (APGA, No. 17 at p. 6)

Based on the comments received, DOE is proposing to not include the 25 percent cost limit in the definition of "major renovation."

Regarding the issue of renovating a Federal building in phases over more than one year, the applicability of the requirements are again tied to the design for construction. If the cost of the design for construction, although performed in different phases, would trigger application of the fossil fuel requirements and the phases are known in advance, the fossil fuel requirements would apply. The construction phases should be planned such that the fossil fuel reductions are achieved by the time the entire project is complete.

DOE proposes to clarify how the requirements would be applied to portions of a building or individual systems being renovated as part of a major renovation. DOE does not intend to require Federal agencies to meet the fossil fuel-generated reduction requirements for an entire building when an agency renovation is limited to system or component level retrofits. DOE proposes that the fossil fuel reduction requirements apply only to the fossil fuel consumption associated with the portions of the building or building systems that are being renovated and only to the extent that the scope of the renovation provides an opportunity for compliance with the applicable fossil fuel-generated energy consumption reduction requirements.

This addition to the regulatory language would direct Federal agencies to determine whether the extent of the renovation allows for compliance with the requirements. For example, a renovation that overhauls a major energy-consuming system (e.g., lighting, HVAC, envelope, etc.) is likely a major renovation subject to today's requirements because the renovation likely allows for compliance with the rule. Additionally, DOE proposes to distinguish between a major renovation that is a whole building renovation, and a major renovation that is limited to a system or component level retrofit.

As reflected in the comments received, DOE acknowledges that it would often be technically impracticable in light of an agency's specified functional needs to meet the requirements of today's rule during a major renovation. A major renovation could range from what is essentially a "gut rehab" or total replacement of all building systems without replacement of the building structure itself to a replacement of a single system or piece of equipment to replacement of several systems in a building. DOE believes that given the \$2.5 million or "public building" threshold, the fossil fuel-generated energy consumption requirement will primarily apply to Federal commercial buildings. The Department notes, however, that the rule could apply to certain multi-family housing that costs at least \$2.5 million that is built by or for the use of any Federal agency, including buildings built for the purpose of being leased by a Federal agency and privatized military housing.

With a complete whole building renovation, the building is stripped down to its structural elements and all new systems (including envelope, lighting, HVAC, and water heating systems) are installed. Generally, the designer of the renovation has less flexibility in design than the designer of a new building. There are also limitations on whole building renovations that may not be present with new construction. The geometry, orientation, and location of the building structure on the building lot are likely to be fixed. As noted, a whole building renovation is one in which a building is gutted to the level of its structural elements. The structural elements of the building should not have a major impact on the fossil fuel-generated energy consumption of the building. The fossil fuel reduction baseline and requirements derived from EIA's CBECS, www.eia.doe.gov/emeu/cbecs, relate to entire building fossil fuel-generated energy consumption, not the fossil fuel consumption of individual systems. The level of fossil fuel consumption

impacted through a whole building renovation is comparable to that consumption proposed in the appendices to this proposed rule; i.e., both the subject energy consumption and the maximum permitted amount of energy consumption are at the whole building level. Therefore DOE proposes that the requirements and methodologies applicable to new construction would be applicable to major renovations that are whole building renovations.

Major renovations that are limited to system or component level retrofits, have additional practical limitations for reducing fossil fuel-generated energy consumption. Based on the DOE Buildings Energy Databook, DOE has estimated the contribution of major energy related systems to a commercial building's energy use for primary energy.⁸

Table III.1. Contribution of Energy Use by Major Systems

	Percent
Lighting	20%
Space Heating	16%
Space Cooling	15%
Ventilation	9%
Refrigeration	7%
Electronics	4%
Water Heating	4%
Computers	4%
Cooking	1%
Other	15%
Adjust to SEDS*	5%
Total	100%

* SEDS (States Energy Data System) is used by the U.S. Energy Information Administration to resolve discrepancies between data sources.

There have been improvements in the efficiencies of the systems and components as compared to that which was present in the buildings reported under the 2003 CBECS and 2005

⁸ Based on Table 3.1.4 of the DOE Buildings Energy Databook (<http://buildingsdatabook.eere.energy.gov/TableView.aspx?table=3.1.4>).

RECS databases⁹. A comparison of equipment efficiency changes for chillers and boilers (two pieces of equipment likely to be involved in a major renovation) from the original 1975 ASHRAE Standard 90-75, *Energy Conservation in New Building Design*, to the present FEMP-designated efficiency requirements for these pieces of equipment showed cooling end-use savings of up to 34 percent and heating end-use savings of up to 11 percent.¹⁰ The same analysis report shows a similar comparison for lighting indicated a potential savings of up to 52 percent of the lighting load if lighting power density requirements from ASHRAE 90.1-2010 were compared with those found in ASHRAE 90A-1980. However, many Federal buildings have likely already undergone some lighting renovation, so it may be unlikely that a Federal building still has a lighting system based on 1980 standards. Therefore, even if the subject energy use is limited to the energy use of the retrofitted system or component, the improvements in energy efficiency as compared to the systems and components in the typical CBECS building are not sufficient to meet the required reductions. If the impact of the efficiency improvements between current systems and components and those represented in CBECS is considered in the whole building context, a typical commercial building would realize whole building fossil fuel savings of 3 percent for cooling, 2 percent for heating, and 7.5 percent for lighting.

For these reasons, for major renovations that are less than whole building renovations (system or component level retrofits) DOE is proposing establishing the maximum allowable energy use in fiscal years 2013 through 2029 based on the percentage of whole building energy consumption represented by the retrofitted system or component. The applicable value from the

⁹ See discussion below in Section C. Establishing and Using the Baseline.

¹⁰ See Simulation Analyses in Support of DOE's Fossil Fuel Rule for Single Component Equipment and Lighting Replacements by M Halverson and W Wang of Pacific Northwest National Laboratory at http://www.pnl.gov/main/publications/external/technical_reports/PNNL-22887.pdf

appendices in today's rule would be multiplied by this percentage to arrive at the maximum allowable energy use of the retrofitted system or component. DOE requests comment on whether further direction would be required on how to distinguish between a major renovation that is a whole building renovation and one that is a system or component level retrofit, and requests comment on how such a distinction could be made.

To further address issues related to major renovations, while ensuring that a fossil fuel-generated energy reduction is attained during a renovation, today's rulemaking would require both that Federal agencies achieve specified energy efficiency levels before applying off-site renewable energy generation and before petitioning for a downward adjustment. Again, the proposed rule would distinguish between whole building renovations and system and component level retrofits. These changes are described further in the "Off-Site and On-Site Renewable Energy and Renewable Energy Certificates" and "Downward Adjustments for Major Renovations" sections.

4. Multiple Buildings

DOE received one comment from DOD-AF asking whether the \$2.5 million threshold for applicability of the rule would apply to individual buildings or to projects which may have two or more buildings. (DOD-AF, No. 25C at p. 2)

DOE has preliminarily determined that the \$2.5 million threshold should apply to

individual buildings to determine if they are covered buildings under this rule. The statute mandates that the requirements apply to “buildings,” not “projects” or “developments.”

5. Leased Buildings

EISA 2007 modified the ECPA definition of “Federal buildings” to include any building to be constructed by, or for the use of, any Federal agency. This term includes buildings built for the purpose of being leased by a Federal agency and privatized military housing. (42 U.S.C. 6832(6)) In addition, the NOPR limited application of the rule to renovations of leased buildings to only those renovations for which a Federal agency has significant control over the renovation design. 75 FR 63405.

NRDC commented that there is a disconnect between the rule scope and the ECPA definition, which NRDC believes does not permit the exclusion of buildings that have been built for the purpose of being leased by a Federal agency. (NRDC, No. 14 at pp. 4-5) The U.S. Army Corps of Engineers-North Atlantic Division (NAD) commented that it seemed more appropriate to cover Federally leased buildings via the existing EISA 2007 section 435 rules, which require new Federal agency leases to be for ENERGY STAR labeled buildings, since existing buildings will be difficult to retrofit to meet these fossil fuel reductions. (NAD, No. 19 at p. 2) Department of Defense-Office of Under Secretary of Defense (DOD-OUSOD) recommended against applying the rule to any building whose design is not completely under the control of Federal agencies, and suggested that the rule should just state this principle and allow the agencies to apply their own judgment. (DOD-OUSOD, No. 25A at p. 1) EEI asked if there would be a

minimum lease period. (EEI, No. 10 at p. 2)

DOE preliminarily has decided to remove the “significant control” provision for leased buildings covered under today’s rule because the ECPA definition of “Federal building” makes clear that the rule applies only to buildings built specifically for the Federal government. Significant control, therefore, is implicit in the definition.

DOE is aware that compliance with today’s rule for small buildings or spaces that are leased for relatively short periods of time may not be possible. DOE also recognizes that at least two Federal agencies utilize contracts for short-term leases. Therefore, DOE requests comment on whether there should be a minimum lease period or a minimum rentable square footage threshold.

6. Federal Buildings Overseas

The DOD-N commented that including overseas facilities in the definition of Federal building may lead to circumstances where the agency does not have complete control over the design, or where other technical factors challenge the practicality of meeting the fossil energy reductions. (DOD-N, No. 25B at p. 8) DOE recognizes that several agencies have buildings overseas and these buildings may be subject to a variety of legal authorities specific to that agency. DOE intends that the proposed rule would apply to the extent that the requirements are consistent with applicable law. DOE does not intend for the rule to cause any Federal agency to violate other legal authorities. This proposed rule does not expressly address the extent to which

it may be applicable to buildings overseas as each individual agency is best positioned to understand the various and sometimes unique authorities that may be applicable to overseas buildings of that agency. In applying the proposed rule to any given building, Federal agencies must also decide whether the building meets the definition of Federal building at 42 U.S.C. 6832(6) and either the requirement that the building be a “public building” for which a prospectus is required, or the requirement that the building or major renovation cost at least \$2.5 million. (42 U.S.C. 6834(a)(3)(D)(i)) For covered overseas facilities, Federal agencies should use the U.S. climate zone most similar to the location of the proposed building.

7. Residential Buildings

DOE received four comments related to the definition of residential building categories. Lish commented that the rule definition should include housing facilities owned and managed by Federal agencies, such as the National Park Service, Forest Service, and other land management agencies. (Lish, No. 13 at p. 1) The DOD-AF requested that dormitories be removed from the proposed rule because of cost. (DOD-AF, No. 25C at p. 6) DHHS-IHS-OEHE believes there is an inconsistency between the reference to manufactured homes and mobile homes in the rule and in RECS. (DHHS, No. 24 at p. 3)

DOE does not believe any changes to the proposed language in the NOPR are needed as a result of these comments. The statute requires the inclusion of all Federal buildings that are EISA-covered buildings. Some of the building types discussed by commenters may not meet the definition of “public building” at 40 U.S.C. 3301(a)(5) or may not require a prospectus to

Congress as described at 40 U.S.C. 3307, but may meet the \$2.5 million construction cost threshold. Some of the referenced buildings may not meet either threshold. Finally, DOE does not believe there would be an inconsistency between the reference to manufactured and mobile homes in the rule and in the RECS database. For purposes of the RECS database, manufactured and mobile homes are the same product. They are both defined as a housing unit built to the Federal Manufactured Home Construction and Safety Standards (24 CFR 3280), built on a permanent chassis and moved to a site.

8. Privatized Military Housing

DOD-AF stated that DOE should clarify that the rule does not apply to privatized military housing because, in DOD-AF's view, privatized military housing is not "leased by a Federal agency." (DOD-AF, No. 25C at p. 2) In addition, DOD-AF is concerned that the proposed rule may cause many AF Privatized Housing deals that have already been closed to be canceled or renegotiated if they have to comply with the fossil fuel reduction requirements. (DOD-AF, No. 25C at p. 1)

As noted above, EISA 2007 modified the ECPA definition of "Federal building" to apply to any building to be constructed by, or for the use of, any Federal agency. Such term shall include buildings built for the purpose of being leased by a Federal agency, and privatized military housing. (42 U.S.C. 6832(6)) In addition, Congress again mentioned privatized military housing in ECPA when it specified that, "with respect to privatized military housing, the Secretary of Defense, after consultation with the Secretary [of Energy] may, through rulemaking,

develop alternative criteria to those established in subclauses (I) [fossil fuel reduction requirements] and (III) [sustainable design requirements] of clause (i).” (42 U.S.C. 6834(a)(3)(D)(vi)) Although privatized military housing may not meet the definition of “public building” at 40 U.S.C. 3301(a)(5), the proposed rule would apply to privatized military housing with construction costs of at least \$2.5 million. As described in this preamble, this cost threshold would apply on an individual building basis.

9. Other

A few miscellaneous comments were submitted regarding the scope of the rule that did not fit into one of the above subcategories. One comment was submitted by an anonymous commenter and encouraged the use of vacant buildings rather than new construction. (Anon, No. 27 at p. 1) There is nothing in ECPA that would prevent the reuse of vacant buildings.

Earthjustice requested data on the number of new buildings and renovations that are likely and projected to be covered by this rule. (EJ, Public Meeting Transcript, at p. 69) For purposes of developing this supplemental proposed rule, DOE assumed that the Federal government constructs 42 million square feet of new construction per year and renovates 14.6 million square feet per year. This assumption is based on the analysis of three years of construction data purchased by PNNL as part of a commercial building construction dataset. The data is described in “Weighting Factors for the Commercial Building Prototypes Used in the Development of ANSI/ASHRAE/IESNA Standard 90.1-2010”, (Jarnagin and

Bandyopadhyay, 2010). Data from the years 2007, 2008, and 2009 were used.

Based on these analyses and assumptions, DOE expects that 44.6 million square feet of Federal building stock would be subject to this regulation each year. Over the next twenty years, DOE expects that this rulemaking would affect approximately 892 million square feet of Federal floor space. This represents less than 25 percent of the total Federal building stock in 2030, and about a quarter of one percent of the total residential and commercial building floor space in the U.S. in 2030.

C. Establishing and using the Baseline

The CBECS and RECS data, which can be found at <http://www.eia.doe.gov/emeu/cbecs/contents.html> and at <http://www.eia.gov/emeu/recs/contents.html>, are based on actual reported energy use over a large sample of buildings, normalized for size to thousands of British thermal units per square foot of floor space (kBtu/ft²). For purposes of this rulemaking, the statute directs DOE to establish a baseline based on the energy consumption in similar buildings in fiscal year 2003 as measured by CBECS and RECS.

One characteristic of buildings reported in the surveys is their age, or vintage.¹¹ The 2003 CBECS estimates of building vintage range from pre-1920 buildings (representing the

¹¹ http://www.eia.gov/emeu/cbecs/cbecs2003/detailed_tables_2003/2003set1/2003pdf/a1.pdf

oldest) to the 2000-2003 years, which are the newest buildings in the 2003 CBECS.¹² An analysis of the CBECS data indicates that 39 percent of the surveyed buildings were constructed prior to the publication of a standard energy code; the first widely recognized building energy codes were developed and published in 1975.¹³ Furthermore, DOE estimates that an additional 17 percent of the surveyed buildings were built before the architecture and construction industry recognized and used ASHRAE 90-75 nationally; i.e., 1980. Therefore, an estimated 56 percent of the buildings surveyed were constructed prior to 1980.¹⁴ The “typical building” in the 2003 CBECS was likely built between 1970 and 1979.

The ASHRAE code is revised on a three year cycle. The version of the ASHRAE code that is applicable to new Federal commercial buildings for which design for construction began on or after August 10, 2012, is ASHRAE 90.1-2007. 10 CFR 433.4(a)(2). As compared to ASHRAE 90-75, ASHRAE 90.1-2007 has an energy efficiency improvement of approximately 30 percent.¹⁵ ASHRAE 90.1-2010 adds an additional energy efficiency improvement of approximately 18.5%.¹⁶ Although the average building in the 2003 CBECS would have been built to ASHRAE 90-75, it is important to note that in the course of the lives of these buildings, building system components have been replaced over time so that the energy consumption as surveyed in 2003 will not be the same energy level the building used when first constructed.

¹² Because of the criteria for buildings subject to the requirements, DOE has initially determined the proposed requirements would apply primarily to commercial buildings. As such, DOE has focused this discussion on CBECS.

¹³ ASHRAE Standard 90-75, *Energy Conservation in New Building Design*, August 1975.

¹⁴ DOE estimates that even more than 56% of the surveyed buildings would have used 90-75, since the adoption of the 1980 standard was delayed two years.

¹⁵ ASHRAE Journal article titled “35 Years of Standard 90.1” in March 2010.

http://www.ashrae.org/File%20Library/docLib/Public/20100625_ASHRAEDAJ10Mar0220100301.pdf

¹⁶ See DOE’s final determination notice on Standard 90.1-2010 at 76 FR 64904 (October 19, 2011) or <http://www.gpo.gov/fdsys/pkg/FR-2011-10-19/pdf/2011-27057.pdf>

Even so, the energy efficiency improvements that are already required for the design of new Federal buildings would achieve a substantial portion of the fossil fuel-generated energy consumption reductions required in the interim years up to FY 2020. DOE has data that would indicate that Federal offices in Climate Zones 1a (Miami, Florida) , 4c (Salem, Oregon), and 5a (Chicago, Illinois) as constructed to the requirements of the Federal baseline standard (90.1-2010) are approximately at the 65% Fossil Fuel Reduction level for government offices. Buildings constructed to be 30% better than 90.1-2007 (as required in the Federal standards if life-cycle cost-effective) will achieve more than 65% Fossil Fuel Reduction level for government offices. This is especially true considering that new Federal buildings must be designed to achieve an energy efficiency improvement 30 percent beyond the referenced ASHARE code to the extent life cycle cost effective.

The CBECS and RECS data are reported at a high level. At the highest level, the utility of the data is limited in terms of climate zones and building types. However, CBECS and RECS microdata allow additional analysis and refinement. Recognizing the importance of climate on building energy use, as well as the limitations in CBECS and RECS, in the NOPR, DOE asked several questions about refinements to the CBECS and RECS data by different categories. The questions included whether the baseline should be adjusted for climate, how to treat plug and process loads, whether the rule should differentiate between fossil fuels, and whether the rule should include a regional adjustment to the fossil fuel component of the electric power mix. These and other issues are further addressed below.

1. CBECS and RECS Baselines

As previously indicated, the statute directs DOE to establish a baseline for the fossil fuel-generated energy consumption requirements using CBECS and RECS data from fiscal year 2003. A preliminary survey of the CBECS data indicates that the average building in the 2003 CBECS was subject to the 1975 version of the ASHRAE building code for commercial buildings.¹⁷

The building type definitions for commercial buildings used in the NOPR were based largely on the CBECS and RECS glossaries, with minimal modifications for regulatory clarity. For a commercial building type not listed in CBECS, the NOPR proposed that agencies establish a baseline for the proposed design using the procedures in Appendix G, Performance Rating Method, of ASHRAE Standard 90.1-2004. For residential building types not listed in RECS, agencies would develop a baseline using the Simulated Performance Alternative from section 404 of the IECC, 2004 Supplement Edition.

DOE requested comments on the building type categories and definitions. Most of the comments DOE received related to how to establish a baseline for building types not listed in the tables derived from CBECS and RECS.

The American Society of Heating, Refrigeration and Air Conditioning Engineers Standard 100 Revision Committee Standard (ASHRAE Standard 100 Committee) commented that an analysis by DOE's Oak Ridge National Laboratory (ORNL) determined that there is

¹⁷ DOE has preliminarily determined that the building criteria that determine applicability of the requirements would result in primarily commercial buildings being subject. As such, DOE has focused on commercial buildings.

sufficient data in CBECS to establish energy consumption targets for 48 building types, and recommended that the rule be modified to do so. (ASHRAE, No. 8 at p. 1) ICC and the Institute for Market Transformation (IMT) endorsed the uses of the CBECS and RECS databases. (ICC, No. 11 at p. 3; IMT, Public Meeting Transcript, No. 7 at p. 26) DHHS-IHS-OEHE supported DOE's interpretation of the CBECS and RECS baselines and commented that building type definitions are appropriate, but requested clarification of the definition of health care (outpatient) facilities with diagnostic medical equipment. (DHHS, No. 24 at pp. 1, 3)

EEI agreed with use of CBECS but commented that some buildings do not neatly fall into a building category. (EEI, No. 10 at p. 3) AGA encouraged the Department to develop more detailed procedures for building types not directly represented in the CBECS and RECS data, and believes the Department may engage stakeholders in this analysis. (AGA, No. 16 at p. 3) NAD and DOD-AF commented that the CBECS and RECS data does not cover some building types and larger buildings of a more industrial nature, such as military buildings, and requested information on how these will be included. (NAD, No. 19 at p. 1; DOE-AF, No. 25C at pp. 3-4)

Regarding the use of ASHRAE or the IECC, EEI recommended that ASHRAE 90.1-2004 should be allowed as an alternative to the IECC 2004 Supplement for residential buildings without baseline data. (EEI, No. 10.2 Cover Letter at p. 2) Several commenters noted that there would be a disparity between the baselines generated from CBECS and the baselines generated using ASHRAE 90.1-2004. (DHHS, No. 24 at p. 4; National Nuclear Security Administration, No. 9 at p. 1; EEI, No. 10 at p. 3; DOD-AF, No. 25C at p. 4) The Gas Technology Institute (GTI) proposed that DOE amend the ASHRAE Performance Rating Method to create a single

reference building in order to be consistent with the CBECS database methodology, noting that DOE's Home Energy Score Tool methodology would be a superior approach. (GTI, No. 22 at p. 12) NIBS supported DOE's proposal to use Appendix G of ASHRAE Standard 90.1 and the IECC Simulated Performance Alternative, stating that these are probably the best alternatives to CBECS and RECS. However, NIBS noted there could be some issues with the quality of the baselines produced using these methods, and suggested certification of modelers and use of the COMNET protocols. (NIBS, No. 12 at p. 2)

ICC and IMT stated that the CBECS and RECS data are in need of upgrading. NIBS encouraged DOE to expand sample sizes and improve the surveys going forward. (NIBS, No. 12 at pp. 1-2) DOE regularly updates and improves upon the CBECS and RECS. The versions of these surveys that DOE chose to use in today's rule (2003 CBECS and 2005 RECS) were based on Congressional direction in EPCA. DOE chose to use 2005 RECS data because the RECS was conducted in 2001 and 2005 but not 2003.

DOE proposes to retain CBECS as the baseline for commercial buildings and RECS as the baseline for multi-family high-rise and low-rise residential buildings with one exception. In the NOPR, DOE proposed to include the category "multi-family in 5 or more units" in the commercial building and multi-family high-rise residential building requirements. A "multi-family high-rise residential building" is a residential building that contains three or more dwelling units and that is designed to be four or more stories above grade. It is possible that a building could have four or more stories above grade, but fewer than five units. DOE believes that such buildings designs would be rare and would have energy consumption patterns similar to

such buildings with five or more units. To avoid a potential gap in coverage of the building types, DOE proposes to use “multi-family high-rise residential building” in place of “multi-family in 5 or more units.” In addition, regarding the definition of health care (outpatient) facilities with diagnostic medical equipment, the reference to diagnostic equipment is from the current CBECS building types under which agencies have been reporting. DOE proposes that agencies continue to apply that term consistent with CBECS reporting.

In response to comments, DOE preliminarily has decided to use the analysis from ORNL for the ASHRAE Standard 100 Revision Committee to expand the CBECS data from the twelve building categories used in the NOPR to the 48 commercial building types used in today’s rule. (As noted in the NOPR, the phrases “principal building activity” and “building types” are used interchangeably in CBECS and RECS documents. For the sake of consistency, this document only uses the phrase “building type.”) While ORNL was conducting the climate adjustment for DOE, as DOE indicated it would conduct in the NOPR, it coordinated its work with the ASHRAE Standard 100 Revision Committee, which had a need for similar work. While developing the climate adjustment method, ORNL also developed a methodology to parse the CBECS and RECS microdata into more building types. As a result, as part of its public comment on today’s rulemaking, the ASHRAE Standard 100 Revision Committee requested that DOE use these building types. Although the reduction requirement for multi-family high-rise residential buildings comes from the RECS database, DOE proposes to include the requirements in the tables for 10 CFR part 433 to maintain the scope of coverage of part 433 versus part 435 building types.

2. Climate Adjustment

The maximum allowable fossil fuel-generated energy consumption values in Tables 1 and 2 of the NOPR were based on national averages not adjusted for climate. The NOPR noted that the limited number of buildings surveyed by CBECS and RECS data does not always allow for a direct estimate of building energy use by climate zone and building type because there are only a few surveyed buildings that fit into some building type/climate zone groups. 75 FR 63406. However, DOE noted that it believed a climate adjustment is necessary to provide reasonable baselines and, therefore, stated that DOE is developing fossil fuel-generated reduction requirements based on building type and then applying a climate zone as defined in the baseline energy efficiency standards at 10 CFR parts 433 and 435. 75 FR 63406. DOE requested comments on including a climate adjustment.

Most of the comments DOE received regarding the climate adjustment were favorable. The ASHRAE Standard 100 Committee recommended that the maximum allowable consumption values for each of the CBECS and RECS building types be adjusted for each of the 16 climate zones developed by DOE's Pacific Northwest National Laboratory (PNNL) based on a simulation of prototype buildings meeting ASHRAE Standard 90.1-2004 developed by DOE's National Renewable Energy Laboratory (NREL). (ASHRAE, No. 8 at p. 1) NIBS recommended utilizing the climate normalization techniques developed by EPA for the ENERGY STAR program. (NIBS, No. 12 at p. 4) ICC states that it believes that it is sensible to take into account regional climate variations, such as those recognized in the International Energy Conservation

Code. (ICC, No. 11 at p. 2) DHHS-IHS-OEHE and the American Institute of Architects (AIA) urged DOE to consider regional and climatic factors, and DHHS-HIS-OEHE suggested using the climate zones identified in ASHRAE 90.1 and IECC. (DHHS, No. 24 at p. 1; AIA, No. 15 at p. 2) GTI recommended the DOE Home Energy Score Tool used for existing home ratings. (GTI, No. 22 at p. 11) The National Park Service, Alaska Region (NPS-Alaska), recommended an alternative table of Alaskan climate zones. (NPS-Alaska, No. 6, p. 1) EEI questioned how the adjustments are going to be calculated to address the limitations of the CBECS and RECS data. (EEI, No. 10 at p. 3) AGA commented that a climate adjustment is logical for some loads, such as space conditioning, but requested more information about DOE's methodology. (AGA, No. 16 at p. 4)

DOE proposes to include a climate adjustment. A climate adjustment places buildings in different climates on a more level-playing field. Under the proposed climate adjustments, buildings would have to achieve reductions commensurate to a baseline appropriate for their climate zone rather than a national average baseline. As a result, buildings in cold climates would have a higher target to account for the increased energy use associated with a cold climate, and buildings in warmer climates would have a lower target. This approach would ensure that buildings in both cold and warm climates achieve 55 percent reductions based on a climate-adjusted baseline, rather than the building in the cold climate having to achieve a deeper percentage reduction and a building in a warm climate having to achieve a lesser percentage reduction to meet the same absolute target based on a national average.

For example, assuming a CBECS or RECS national average baseline fossil fuel use

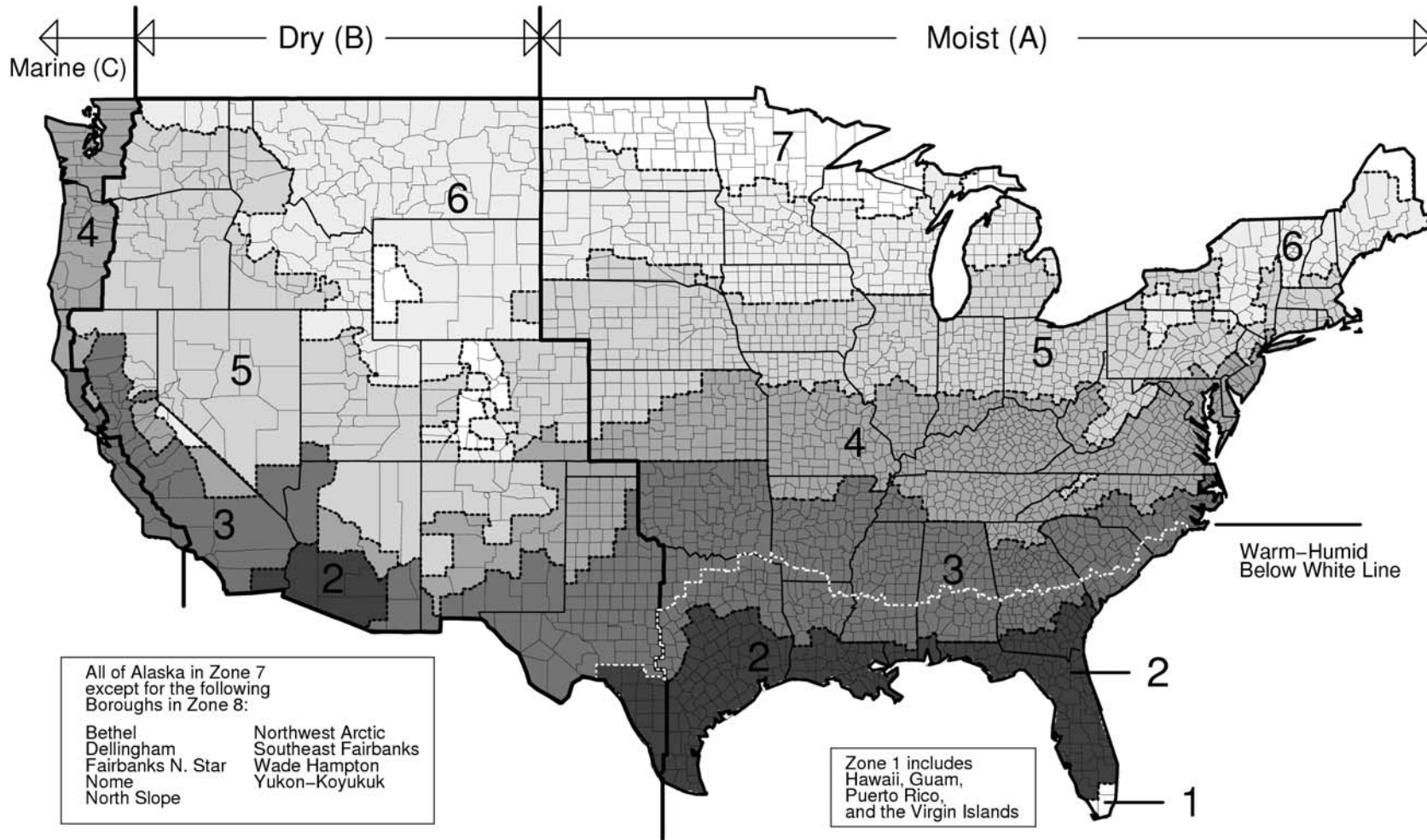
equals 100 kBtu/sq.ft. for a given building, at a 55 percent reduction for FY 2010-14, the target fossil use becomes 45 kBtu/sq.ft. However, a building in a cold climate may actually use more than the national average, perhaps 150 kBtu/sq.ft. The same building in a warm climate may actually use less, perhaps 50 kBtu/sq.ft. To meet the 55 percent reduction for the FY 2010-14 national average target of 45 kBtus/sq.ft. without a climate adjustment, a building in a cold climate must achieve a reduction of 105 kBtus/sq.ft. (which would be an actual 70 percent reduction), while the same building in a warm climate would need to achieve a reduction of only 5 kBtus/sq.ft. (which would be an actual 10 percent reduction).

Using the above example, the climate adjustment in today's rule would set the baseline at 150 kBtu/sq.ft. for the cold climate example, so a 55 percent reduction would make the target 67.5 kBtu/sq.ft. instead of 45 kBtu/sq.ft. In the warm climate example, the baseline would be 50 kBtu/sq.ft., and a 55 percent reduction would make the target 22.5 kBtu/sq.ft. instead of 45 kBtu/sq.ft. In other words, buildings in both the warm and cold climate zones have to achieve 55 percent reductions but must meet that baseline relative to the climate adjusted baseline for the appropriate climate. The same logic applies to the 65, 80, 90, and 100 percent reductions. All covered buildings designed in FY 2030 or later would be required to meet the 100 percent reduction, regardless of climate.

The maximum allowable fossil fuel-generated energy consumption in proposed Tables 1-4 of Appendix A of both part 433 for commercial buildings and multi-family residential buildings and part 435 for low-rise residential buildings include adjustments for climate. The climate adjustments were developed by ORNL. ORNL developed national energy use intensities

(EUIs) for over 50 building types from CBECS and RECS, and used zonal EUI ratios derived from building simulation modeling performed by the NREL to parse the building types into 16 different climate zones. The procedure is described in more detail in “Derivation of Federal Building Fossil Fuel Energy Use Reduction Targets,” (ORNL/TM-2011/84, <http://hyperion.ornl.gov/pubs/EISATargets.pdf>). DOE’s climate zone map is produced below for reference. The county-by-county climate zones are defined in the baseline standard for 10 CFR part 433 -- ASHRAE Standard 90.1-2010.

Figure 1 – U.S. Department of Energy Climate Zone Map



Source of Image: www.resourcecenter.pnl.gov

3. Plug and Process Loads

In addition to fossil fuel-generated energy consumption used for building-related functions such as lighting, HVAC, and envelope, equipment related to the use that occurs within the building also consumes fossil fuel-generated energy. This includes plug loads such as office equipment, personal computers, cash registers, and other such equipment that are typical to buildings. However, some building types also house process loads that are very energy-intensive relative to other building-related energy use.

In the NOPR, DOE acknowledged that inclusion of plug and process loads in the methodology may make it more difficult to achieve the mandated fossil fuel-generated energy consumption reductions. DOE noted that all building energy consumption, including plug and process load consumption, is included in the baseline CBECS and RECS data and, therefore, proposed that plug and process loads would be subject to the fossil fuel reductions.

DOE requested comments on how the proposed rule could be designed such that the assumptions used in the whole building simulations would accurately reflect the final building design and operation, including plug and process loads. 75 FR 63410. In this SNOPR, DOE clarifies that CBECS does not include building types with energy use dominated by process loads.

Several comments were submitted relating to plug and process loads. Most comments received on plug and process loads expressed concerns about including process loads in the fossil fuel-generated energy consumption baselines, with particular concern about including energy-intensive process loads. EEI, DHHS-IHS-OEHE, DOD-AF, ASHRAE 100, and AGA commented that process or plug and process loads should not be included in the calculations since these loads do not directly represent the building design attributions. (EEI, No. 10 at p. 6; DHHS, No. 24 at p. 4; DOD-AF, No. 25C at p. 5; ASHRAE, No. 8 at p. 2; AGA, No. 16 at p. 4)

DOE received a number of comments from DOD suggesting that because many DOD facilities do not map to the CBECS building types, DOE should remove the process load component from the calculations or otherwise treat certain buildings with process loads differently. (DOD-AF, No. 25C at p. 4; DOD-OUSOD, No. 25A at p. 2; NAD, No. 19 at p. 1; DOD-N, No. 25B at p. 9) Otherwise, DOD-N noted, petitions for downward adjustment of the reduction requirement could consist predominantly of buildings dominated by process loads. (DOD-N, No. 25B at pp. 6, 9, 12) DOD-N recommended standardized building occupancy and use assumptions. (DOD-N, No. 25B at p. 6)

CBECS and RECS do not include building types with what are generally understood to be energy-intensive process loads. Process loads are typically metered separately and do not include energy consumed for maintaining comfort and amenities for the occupants of the building (including space conditioning and lighting for human comfort or convenience), commercial equipment and office-related plug loads, and other loads whose energy use is included in the building categories in CBECS and RECS (such as medical equipment and

commercial refrigeration). Energy-intensive process loads would include, but not be limited to, activities such as manufacturing, painting, welding, metal work, fabricating, assembly, and data centers.

In the proposed rule, the baseline for building types not in CBECS or RECS would have been determined by a whole building simulation, and the process loads would have been subject to the fossil fuel-generated energy consumption reduction requirements. DOE understands that it could be much more difficult for agencies designing buildings with energy-intensive process loads to comply with the requirements of today's rule than agencies designing buildings without process loads. It is more difficult to reduce process energy consumption, and the process activity is critical to the agency's purpose for the building. In addition, for buildings with energy-intensive process loads, the process loads tend to dominate the energy consumption of the building. As a result, DOE acknowledges that agencies with buildings with such process loads may be the agencies most likely to petition DOE for a downward adjustment of the standard if the process loads were subject to the fossil fuel reduction requirements. DOE also notes that plug and process loads are excluded from the baseline energy efficiency requirements for Federal commercial and multi-family high-rise residential buildings. (See 10 CFR 433.101)

Based on these considerations, DOE proposes that for building categories and types not listed in CBECS with energy-intensive process loads, the process loads should not be subject to the fossil fuel-generated energy consumption reduction requirements of this rule. These building types would remain subject to today's requirements by separating the process loads from the building and building-related loads as follows:

1. Federal agencies with buildings with energy-intensive process loads would choose the CBECS building type (from Tables 1-4 of Appendix A) that most resembles the building as if it had no process loads. For example, industrial facilities and airplane hangars for painting/plating would generally map to warehouses, and data centers would generally map to laboratories.
2. Agencies would then find the appropriate target from Tables 1-4 based on climate zone and fiscal year in which design for construction began for the underlying building type selected in Step 1. Because Tables 1-4 do not include these process loads, agencies would add to the target the estimated fossil fuel-generated energy use of the process loads to determine the maximum allowable fossil fuel-generated energy consumption for the proposed building. When estimating the process load, the agency would use the electricity fossil fuel generation factor and the electricity source energy factor defined in this rule to convert electricity into kBtu/sq.ft.
3. To determine compliance, agencies would estimate the energy use and fossil fuel-generated energy consumption of the proposed building using the equation in section 433.201(a) (for CBECS) or 435.201(a) (for RECS), add the estimated process load from Step 2, and compare the result to the maximum allowable fossil fuel-generated energy consumption.

DOE believes that this calculation for buildings with process loads, along with the expanded list of building types described earlier, would make it unnecessary to develop an alternative baseline using a simulated model as was proposed in the NOPR. The expanded list of building

types is comprehensive and should cover virtually all building types and categories in the Federal sector. Agencies should be able to find a building type from the expanded list that closely resembles the building as if there were no process loads. Thus, DOE has deleted provisions in the proposed rule to develop alternative baselines using Appendix G of the Performance Rating Method in ASHRAE Standard 90.1-2004 or the IECC Simulated Performance Alternative. DOE believes this approach is simpler and clearer than the method proposed in the NOPR, and addresses the concerns and comments that were submitted.

DOE seeks comment on three specific issues related to process loads:

1. DOE recognizes that not all building categories or building types are equally represented in CBECS data. Additionally, energy use can vary widely within the same building category or type. Therefore, DOE requests additional comment on the treatment of process loads for building categories that are under-represented in CBECS, or where energy use varies widely. DOE also seeks comment on what parameters to use when determining that a building is under-represented in CBECS.
2. In addition, DOE recognizes that buildings with high process loads must increase the capability of their HVAC systems beyond what the building would require absent the building's process-related mission. Therefore, DOE seeks further comment on whether and how to account for the increment of supplemental HVAC required to condition buildings with high process loads.

3. DOE understands that agencies may not be uniformly equipped to submeter their process loads for the purposes of calculating their required fossil fuel reduction. Therefore, DOE requests comment on the degree to which agencies presently submeter process loads.

Concerning plug loads, GTI suggested that the additional variability in plug loads is a legitimate issue, but suggested that it is an issue that can be addressed by a good engineering analysis during the design phase. (GTI, No. 22 at p. 12) EEI stated that the methodology must treat plug loads the same for purposes of both the baseline and the proposed design. (EEI, No. 7 Public Meeting Transcript, at p. 33-35)

Plug loads are included in the building types reported by the CBECS and RECS databases. In addition, they generally do not dominate the building energy profiles like some process loads, and it is easier to achieve plug load reductions through the use of ENERGY STAR and other energy efficient products than it is to reduce process loads. As a result, DOE preliminarily has decided that plug loads would continue to be included in the baseline and would be subject to the fossil fuel reduction requirements.

4. Differentiate Between Fossil Fuels

Some fossil fuels produce higher CO₂ emissions than other fossil fuels, with coal being the highest and natural gas being the lowest. The NOPR noted that ECPA makes no distinction

between fossil fuels for purposes of the required fossil fuel-generated energy consumption reductions addressed by this rule. 75 FR 63406 While the statute does not specifically direct DOE to consider variation in fossil fuels for purposes of this rulemaking, DOE stated that the statute does not prohibit DOE from taking the variation into account. With that in mind, DOE requested comments on whether all fossil fuels should be treated equally or whether each should be treated differently based on CO₂ emissions or some other factor.

DOE received several comments about differentiating between fossil fuels. The comments varied, although most favored differentiating between fossil fuels. DHHS-IHS-OEHE supported taking into consideration the actual CO₂ emission factors of fossil fuel types and whether or not a fuel comes from domestic or imported sources. (DHHS, No. 24 at p. 2) DOD-N, National Rural Electric Cooperative (NREC) and the General Services Administration-Office of Federal High Performance Green Buildings (GSA) also supported weighting fossil fuels based on their respective carbon footprints. (DOD-N, No. 25B at p. 4; NREC, No. 28 at p. 2; GSA, No. 26 at p. 2) The Office of the Deputy Under Secretary of Defense, Installations and Environment, Facilities Energy Directorate (ODUSD) believes such an approach would help, but recommended a thorough study of the potential cost impact prior to implementing such a policy. (DOD-OUSOD, No. 25A at p. 3) GTI recommended that fossil fuel types be distinguished by their cost, efficiency and CO₂ content. (GTI, No. 22 at p. 13) The AGA commented that the DOE should restrict its consideration only to fuel cycle issues, not carbon contributions of fuel cycles, because greenhouse gas emissions are not the dominant issue in this rulemaking. (AGA, No. 16 at pp. 4-5)

DOE notes that ECPA establishes building design requirements based on “fossil fuel-generated energy consumption” of a building, not greenhouse gas emissions of a building or other factors that may differentiate fossil fuels. Upon reconsideration of the issue as it was proposed in the NOPR, DOE believes that applying the reduction requirements equally to all fossil fuel types is the best interpretation of the statute. As a result, DOE is not differentiating between fossil fuels in today’s rulemaking.

5. Regional Fossil Fuel Factors

To determine the fossil fuel-generated energy consumption of the buildings reported in CBECS and RECS, the fossil fuel component of the electricity used by the building was added to the building’s direct fossil fuel consumption. To calculate the fossil fuel component of site electricity use, site electricity was multiplied by the percentage of electricity nationally that is produced from fossil fuels, referred to as the electricity fossil fuel generation factor for purposes of this rule. The factor was obtained by summing the electricity generated from fossil fuels (coal, oil, natural gas, and other gases) from Table 3.2.A of the Energy Information Administration (EIA) 2012 Electric Power Annual Report (http://www.eia.gov/electricity/annual/html/epa_03_02_a.html) and dividing it by the total electricity produced in the U.S. 75 FR 63407. According to Table 3.2.A, for 2003, the fossil fuel generation factor was 0.71, meaning that about 71 percent of all electricity in the U.S. is generated from fossil fuels. DOE chose to use the 2003 value in accordance with the statutory mandate that buildings be designed so that the fossil fuel-generated energy consumption of the buildings is reduced as compared with such energy consumption by a similar building in fiscal

year 2003 (as measured by CBECS or RECS.) In addition, DOE notes that the fossil fuel generation factor has varied from 0.71 in 2003 to a peak of 0.74 in 2007 and back to 0.71 in 2012. DOE indicated in the NOPR that it was considering a regional approach to establishing the fossil fuel fraction associated with electricity, and asked for comments.

Public comments were mixed, some supporting and some opposing the use of a regional fossil fuel factor. EEI questioned whether adjustments for regional electricity use would be made by census region, sub-census region, power pool region, by state, or by some other form of disaggregation. (EEI, No. 10 at p. 3) GSA also supported a regional approach. (GSA, No. 26 at p. 1) AGA supports use of a regional fossil fuel mix for electric generation based on eGRID sub-regional level data. (AGA, No. 16 at p. 4) The ICC supported the current proposed approach of using the national average, stating that it would be more efficient to simplify the requirements and smooth the differentials between buildings by using a national average fossil fuel generation factor. (ICC, No. 11 at pp. 2-3) GTI stated that for the purposes of national rulemaking, national average factors would be consistent with some of DOE's prior methodology and protocols. (GTI, No. 22 at p. 7) DHHS-IHS-OEHE and NIBS also support the national average fuel mix. (DHHS, No. 24 at p. 2; NIBS, No. 12 at p. 2) NAD stated that the electricity source energy factor and electricity fossil fuel-generation factor should be based on a regional approach. (NAD, No. 19 at p. 1)

The difference in regional fossil fuel factors would not increase overall fossil fuel reductions, but would simply shift where reductions come from. Buildings in regions with high fossil fuel content in their electric power mix would require deeper reductions in electricity use

than buildings in regions with lower fossil fuel content in their electric power mix. For agencies with buildings across the nation, the fossil fuel content of their buildings, in the aggregate, would tend toward the national average. Introducing regional differences adds complexity to the rule with little additional benefit.

Finally, the source of electricity used in a region may be different than the source of electricity generated in that region. Power may be generated in one place, but shipped via the grid to another area for use. Utilities may purchase power from another utility or a merchant plant at a distant location. While data on power generation is readily available, data on where the electricity in an area comes from and how it was produced is more difficult to trace. This leads to the question of what the appropriate breakdown of region would be – utility district, state, power pool area, or interconnection grid.

Based on these preliminary conclusions, DOE proposes to use the national electric power mix in determining the fossil fuel portion of electricity consumption in the rule. Using the national average fossil fuel factor is simpler for Federal agencies and DOE believes it would yield equivalent results. In addition, DOE proposes to calculate and post the value of the fossil fuel generation factor to be used each year on the FEMP website and as an update to this regulation¹ rather than requiring agencies to refer to the Buildings Energy Data Book on an annual basis as was proposed in the NOPR.

6. Marginal Source of Electricity

¹ <http://energy.gov/eere/femp/federal-energy-management-program>

The NOPR stated that reductions in future electricity demand are likely to cause electric utilities to reduce the power supplied by those electricity generation units or sources that have the highest marginal costs. DOE believes that over the short and long-run, fossil fuel-powered units would have higher marginal costs than units powered by nuclear, hydropower, or renewable energy sources. DOE invited comments on whether marginal factors to estimate the fossil fuel consumption associated with electricity consumption should be considered, on grounds that marginal factors might better reflect the fossil fuel portion of new generating capacity that is being built. 75 FR 63407. For example, if almost all new electricity generation capacity built for new demand in the coming years is from non-fossil sources of energy, then it might be reasonable for new Federal buildings to reduce only their locally consumed fossil fuel consumption and not focus on reducing electricity demand to meet the requirements of the rule.

AGA commented that the rule should not use marginal electricity generation, noting that the most equitable means of including new “marginal” generation into the electric grid is as additional supply to the average mix. (AGA, No. 16 at p. 4) DOD-N recommended using marginal fossil fuel reduction factors, averaged nationally. (DOD-N, No. 25B at p. 4) NIBS commented that it would be appropriate to consider the time of such electricity use and its likely impact on the fossil fuel mix. (NIBS, No. 12 at p. 2) EEI was concerned that the electric grid is changing and the tools used by DOE in the rule are already out of date. (EEI, Public Meeting Transcript, No. 7 at p. 45) EEI commented that the source energy methodology looks backwards and does not account for the dynamic changes to electric generation that will be occurring over the next 20-30 years, and that DOE’s 71 percent electric source factor nationwide is outdated and does not account for the states that have renewable portfolio standards. (EEI, No. 10 at p. 3)

DOE has considered the issue and is proposing not to use marginal electric source factors. The mix of new electric generating capacity added to the grid varies year-to-year. However, the amount of electricity generated from fossil fuels on an annual basis has varied from 68 percent to 72 percent over the past fifteen years, with no discernible trend. If new, marginal generating capacity were steadily becoming more fossil fuel-dependent or less fossil fuel-dependent, there would be a trend in how much electricity is produced from fossil fuel on an annual basis, but such a trend is not discernible in the current data. In addition, the load growth represented by buildings covered by this rule is likely too small relative to overall electric utility load growth to change utility decisions on investment in new generating resources. Furthermore, as the fossil fuel reduction requirement increases toward 100 percent for buildings for which design for construction begins in FY2030, the marginal factors will be less relevant because all fossil fuel use will be eliminated in any event. For these reasons DOE believes it would be best to continue to use average generating capacity for the fossil fuel generation factor rather than marginal generating capacity.

7. Residential Common Areas

The NOPR stated that the RECS baseline for multi-family residential buildings only includes the energy use for individual dwelling units, not any associated conditioned common areas. DOE proposed applying the RECS-derived fossil fuel requirements to all applicable floor space, including both common and non-common areas. 75 FR 63408. Because common areas often have a lower energy intensity than individual dwelling units, using only non-common areas

in the calculation for the proposed design's fossil fuel consumption is likely to result in a slightly higher maximum allowable fossil fuel-generated energy requirement than using both common areas and non-common areas in the calculation. This approach will make it easier for building designers to demonstrate compliance for a residential building overall. Because common areas account for only a small fraction of the floor space in multi-family residential buildings, however, the actual effect on fossil fuel reductions would be minimal.

AGA and DHHS-IHS-OEHE supported application of the energy use values for non-common areas to all applicable floor space, common and non-common. (AGA, No. 16 at p. 4; DHHS, No. 24 at p. 4) Based on the rationale provided in the NOPR and the supporting public comments, this proposed rule continues the approach proposed in the NOPR.

8. Major Renovations

As noted previously in this document, the CBECS and RECS data that provide the baseline for today's requirement are building level data. For major renovations that are whole building renovations, the maximum fossil fuel-generated energy consumption values generated from CBECS and RECS provide requirements that are comparable to the energy consumption of the whole building renovation. However, DOE believes that the maximum consumption levels presented in the proposed tables may not be appropriate for major renovations that are system or component level retrofits. As such, DOE is proposing that the requirements for system and component level retrofits would be based on percentage of whole building fossil fuel consumption represented by the retrofitted system or component. The applicable table value

would be multiplied by this percentage to arrive at the maximum allowable energy use of the retrofitted system or component. DOE requests comment on this approach, as well as comment on other approaches that could be used to determine the requirement for system and component level retrofits.

9. Other

Two additional comments were submitted that do not fit into one of the scope subcategories. EEI asked how mixed-use buildings would be treated. (EEI, Public Meeting Transcript, No. 7 at p. 19) The proposed rule required agencies to perform a building area-weighted average in order to determine the appropriate baseline for mixed-use buildings. 75 FR 63407. The specific method to do this is found in section 433.200(d)(3) of the proposed rule.

NPGA thought a paradox existed in that the required reductions identified for years preceding FY 2030 may change and yet fossil fuel energy consumption reductions may not apply to Federal agencies until the regulations are finalized. (NPGA, No. 23 at p. 4) DOE notes that the specific percentage reduction requirements by fiscal year are defined by statute and cannot be changed by DOE. In the NOPR, DOE stated that DOE intends to revise the maximum allowable fossil fuel-generated energy consumption tables, which are based on the required percentage reductions in the statute, to adjust for climate. 75 FR 63408. DOE has done this in today's rulemaking. DOE acknowledges that the specific means to obtain the FY 2030 goal are not known today, but believes that advances in design practices and technology over the next 20 years will make the requirement increasingly attainable.

D. Methodology to Determine Compliance

Once the appropriate baseline fossil fuel-generated energy consumption has been determined for commercial buildings and multi-family high-rise residential buildings and low-rise residential buildings, this rule provides the statutorily-mandated reduction requirements to those baseline consumption values. As noted in the NOPR, rather than setting standards by only listing the percentage reductions required, DOE has decided to deduct the statutorily-required percent reductions from the CBECS and RECS baselines to establish the maximum allowable fossil fuel-generated energy consumption for each building type and climate zone. 75 FR 63408. Establishing today's standard as an absolute value should simplify agency use and interpretation of this proposed rule.

1. Whole Building Simulation

To determine energy use in the proposed design, DOE proposed in the NOPR that the fossil fuel-generated energy consumption of a proposed new Federal building or major renovation of a Federal building be estimated using the Performance Rating Method found in Appendix G of ANSI/ASHRAE/IESNA Standard 90.1-2004 for commercial and multi-family high-rise residential buildings, and the IECC 2004 Supplement for low-rise buildings. 75 FR 63409. Because of the complexity involved in estimating fossil fuel-generated energy consumption, this requirement would effectively require the use of a whole building simulation tool, which can be difficult and increase cost. As a result, DOE invited comments on alternatives

to a whole building simulation.

The ICC endorsed the use of the Simulated Performance Alternative found in IECC 2004, but suggested that the rule reference more recent versions. (ICC, No. 11 at p. 3) NRDC and NIBS commented that DOE should work with the energy modeling industry to standardize modeling assumptions and results provided by the simulation programs, and eventually certify modeling programs and users. (NRDC, No. 14 at p. 16; NIBS, No. 12 at p. 2) The International District Energy Association (IDEA) was concerned that the Performance Rating Method in Appendix G of ASHRAE Standard 90.1-2004 is based on energy costs, as it modifies the Energy Cost Budgeting Method in Chapter 11 of ASHRAE Standard 90.1. (IDEA, No. 21 at p. 2) DOE proposes that the estimated fossil fuel use of the proposed building be calculated in accordance with the provisions relating to “the proposed design” in the Performance Rating Method in Appendix G of ASHRAE 90.1-2007. Provisions in Appendix G relating to the generation of a baseline or the Energy Cost Budgeting Approach are irrelevant to today’s rule.

As stated in the NOPR, the Performance Rating Method in Appendix G of ASHRAE 90.1 and the IECC Simulated Performance Alternative are already prescribed at 10 CFR parts 433 and 435 for determining whether covered new Federal buildings meet the required energy efficiency standards in those sections. In addition, whole building simulations are already performed today for most medium- and large-sized buildings to accurately estimate loads for purposes of sizing HVAC equipment and to evaluate buildings under voluntary advanced building programs. Based on this and the comments received, DOE is not changing this approach in today’s rule.

On August 10, 2011, DOE published a final rule updating Federal energy efficiency baseline standards in 10 CFR part 435 for low-rise residential buildings to the 2009 IECC. 76 FR 49279. On July 19, 2013, DOE published a final rule updating the Federal energy efficiency baseline standard in 10 CFR part 433 for commercial and multi-family high-rise buildings to ASHRAE Standard 90.1-2010. 78 FR 40945. DOE also acknowledges the need to improve work with the energy modeling industry to standardize assumptions and certify programs and users, but such collaboration is outside the scope of this rule. DOE and ENERGY STAR, drawing upon their experience with EnergyPlus Software and Target Finder, respectively, are participating with the Commercial Energy Services Network (COMNET, www.comnet.org) to develop energy performance modeling guidelines and procedures.

DOE recognizes that the whole building approach likely is not appropriate for major renovations that are limited to system or component level retrofits. As noted previously, for major renovations that are less than whole building renovations (i.e., system or component level retrofits) DOE is proposing establishing the maximum allowable fossil fuel consumption in fiscal years 2013 through 2029 based on the percentage of whole building consumption represented by retrofitted system or component. The applicable table value would be multiplied by this percentage value to arrive at the maximum allowable fossil fuel consumption of the retrofitted system or component. For determining compliance, DOE is proposing basing the subject fossil fuel-generated energy consumption on the system or component as retrofitted. This would require the design engineer to estimate the energy consumption of the systems or components as renovated.

2. Off-Site and On-Site Renewable Energy and Renewable Energy Certificates

The NOPR stated that in order to meet the fossil fuel-generated energy consumption reduction requirements mandated by ECPA, fossil fuel-generated energy consumption could be offset with the use of renewable energy. 75 FR 63410. DOE also recognized that there may be physical limitations to the amount of on-site renewable electricity that can be produced, and it may be more affordable for an agency to purchase electricity from centralized renewable energy-generation facilities. DOE was concerned, however, that the purchase of renewable energy-generated electricity via Renewable Energy Certificates or direct Power Purchase Agreements (PPAs) may simply reduce the amount of renewable energy available for purchase by other entities within the U.S. and may not necessarily lead to an overall decrease in domestic fossil fuel-generated energy consumption. In addition, DOE was concerned that the purchase of Renewable Energy Certificates does not involve a long-term binding agreement and can readily be cancelled. DOE indicated in the NOPR that it was leaning toward allowing direct PPAs with a long-term contract to count toward meeting the fossil fuel-generated energy consumption reduction requirements, but not allowing Renewable Energy Certificates. 75 FR 63410.

Numerous comments were submitted about Renewable Energy Certificates and PPAs. The Renewable Energy Markets Association (REMA) supported the use of Renewable Energy Certificates and stated that as demand outstrips supply, more renewable energy generation will be built. (REMA, No. 20 at pp. 1-2) REMA also indicated that the purchase of Renewable Energy Certificates is allowed to meet other Federal requirements, and commented that PPAs should be allowed only if the renewable energy attributes (the associated Renewable Energy

Certificates) are purchased by the agency as well. (REMA, No. 20 at pp. 1-2)

NAD and NREC encouraged the use of Renewable Energy Certificates to stimulate demand for renewable energy generation. (NAD, No. 19 at p. 2; NREC, No. 28 at p. 2) EEI recommended use of both Renewable Energy Certificates and PPAs with a minimum contract term. (EEI, No. 10 at p. 8) The National Nuclear Security Administration (NNSA) commented that Renewable Energy Certificates should be allowed if the renewable energy was generated on Federal property or, from any source, if the contract is for a period of five years or greater. (NNSA, No. 9 at p. 1) DHHS-IHS-OEHE was concerned that unless the availability of renewable energy sources from the grid is allowed and expanded, these fossil fuel reduction goals will not be met, and therefore supported the use of Renewable Energy Certificates and PPAs. (DHHS, No. 24 at pp. 5-6)

GSA expressed concern about the requirement for long-term contracts, and indicated that GSA cannot procure renewable energy under PPAs in a manner that would make them economical due to their 10 year utility contracting authority under Federal Acquisition Regulation Part 41. (GSA, No. 26 at p. 2) NIBS strongly discouraged the utilization of PPAs or Renewable Energy Certificates as a mechanism for meeting such requirements, stating that it would hamper interest in energy efficient design. (NIBS, No. 12 at p. 3)

AGA opposed the use of Renewable Energy Certificates and PPAs, stating there is no guarantee that they will contribute to fossil fuel reductions. (AGA, No. 16 at p. 5) AGA was also concerned that, because the statute does not address efficient use of energy in Federal buildings,

the rule encourages potentially wasteful use of renewables and nuclear-generated electric energy. (AGA, No. 16 at p. 1) AGA and GTI commented that, if PPAs are allowed, the rule should also allow the purchase of natural gas from renewable sources as well, such as biomethane, biopropane, biofuel oil and biomass. (AGA, No. 16 at p. 5; GTI, No. 22 at p. 14) APGA commented that DOE should not allow contracts to deliver off-site renewable energy to count towards on-site fossil fueled energy reductions because such contracts cannot insure that only non-fossil-fueled electrons are delivered to Federal facilities. (APGA, No. 17 at p. 6)

In addition to Renewable Energy Certificates and PPAs, DOE received several comments from DOD about allowing agencies to use an agency portfolio approach for renewable electricity produced off-site by the agency. These commenters stated that they encourage investment in renewable energy where it is most cost-effective, which is often across a portfolio rather than on a building-by-building basis. (DOD-OUSOD, No. 25A at p. 1; DOD-N, No. 25B at p. 1; DOD-AF, No. 25C at p. 4)

DOE proposes to permit a deduction, subject to limitation, for “on-site renewable electricity generation” and for “off-site renewable electricity generation” (e.g., Renewable Energy Certificates, agency portfolio renewable energy production and off-site PPAs).

Today’s proposal specifies that “on-site renewable electricity generation” is the amount of electricity to be consumed by the subject building that is contributed by renewable electricity generated at the Federal site or facility on which the subject building will be located. Thermal energy produced from a renewable energy source reduces a building’s load and would be treated

the same as energy efficiency for purposes of this rule. Federal agencies that choose to use on-site renewable electricity generation would not be permitted to transfer the environmental attributes of the on-site generation. In other words, agencies would not be permitted to convey the REC associated with the on-site project to an off-site project.

In the proposed regulation Federal agencies are given credit for on-site renewable energy via the renewable energy and CHP electricity deduction in the calculation for the fossil fuel-generated energy consumption of a proposed design. On-site renewable energy would be subtracted from the proposed design's annual site electrical consumption. The building designer typically uses site electrical energy consumption when calculating the building's fossil fuel-generated energy consumption. Deducting renewable energy generation from the proposed design's site electricity consumption before adjusting the electricity consumption for the electricity source energy factor and the fossil fuel generation factor would ensure that renewable energy generation is given appropriate credit for reducing fossil fuel-generated energy consumption. Biomethane, biopropane, biofuel oil, and biomass used on-site, to the extent they can be identified and accounted for, would not be included in direct fossil fuel energy consumption and would qualify as a renewable energy deduction if used to generate electricity.

DOE understands agencies' interest in allowing the use of off-site renewable energy resources, including environmental attributes represented by Renewable Energy Certificates, to help meet the requirements. It may be difficult to achieve the required fossil fuel reductions without use of renewable resources, and on-site renewable resources may not be feasible or available in many cases. Thus, use of off-site renewable electricity resources and/or Renewable

Energy Certificates, may be necessary. In addition, with off-site renewable resources, agencies may be better able to optimize production or reduce costs because of resource availability, economies of scale, and other factors.

While DOE acknowledges the benefits of off-site renewable energy, DOE has some concerns with allowing the use of off-site renewable energy, including Renewable Energy Certificates, without limitation. DOE is concerned that energy representing a Renewable Energy Certificate that is not under substantial control of the Federal agency claiming the REC because ECPA, as amended, requires that each Federal agency meet the reduction requirements for each of its Federal buildings. DOE is also concerned about RECs being not properly tracked and accounted for, and that a REC may not represent new or additional capacity. Additional administrative and accounting complexity could detract from agency compliance.

Therefore, under this SNOPR, agencies would be required to ensure that any renewable energy resources used to meet the rule represent new capacity and are not drawn from existing resources, and the renewable energy generation could not be used to offset the fossil fuel-generated energy consumption of more than one design. DOE believes that requiring off-site generation to represent new capacity would be consistent with the statutory goal of reducing total fossil fuel consumption.

DOE acknowledges that increased demand for Renewable Energy Certificates, whether from the Federal sector or elsewhere, will send a market signal to develop more renewable resources rather than reduce the amount of Renewable Energy Certificates available for other

entities. DOE also recognizes that many commenters support the use of Renewable Energy Certificates as a compliance path for this SNO PR.

To receive credit against the reduction targets under any of the above scenarios, an agency would be required to ensure that the renewable energy environmental attributes are dedicated to meeting the fossil fuel reduction requirements of the subject new or renovated building and not used elsewhere. The renewable energy environmental attributes would need to be retained by the agency. Environmental attributes represent the general environmental benefits of renewable generation such as air pollution avoidance (e.g., sulfur dioxide, nitrogen oxide, methane, carbon dioxide). The exact quantity of the environmental benefit (e.g. pounds of emission reductions of a given pollutant) is not indicated by an environmental attribute, though it can be quantified separately through engineering estimates. The environmental attribute represents all environmental benefits provided by renewable energy generation.

DOE recognizes that the December 5, 2013 “Presidential Memorandum – Federal Leadership on Energy Management” (“Presidential Memorandum”) prioritizes Federal agency renewable energy sources for purposes of meeting the renewable energy consumption goals in the Presidential Memorandum. Federal agencies should consider the prioritization in the Presidential Memorandum when determining how they would comply with this proposed rule.

DOE requests additional comment on the issues related to the use of off-site renewable energy generation, including Renewable Energy Certificates, in complying with the proposed

rule. Specifically, DOE is also concerned about, and requests comment on, how the current state of information and markets would allow Federal agencies to reliably trace a Renewable Energy Certificate to an actual reduction in fossil fuel use.

3. Use of Source Energy

The NOPR stated that CBECS and RECS data does not provide data on total fossil fuel-generated energy consumption in buildings; however, fossil fuel-generated energy consumption can be calculated from CBECS and RECS data by using the following equation:

Fossil fuel-generated energy consumption = Direct consumption of fossil fuels in the building plus the amount of electrical energy consumption that is generated from fossil fuels. 75 FR 63407.

In order to determine the amount of electricity consumed in the building that is generated from fossil fuels, it is necessary to convert site electricity to source energy. Source energy is the total amount of energy used at the site, including the energy used to generate and deliver electricity to the site. Site electricity is converted to source energy by multiplying site electricity by the electricity source energy factor. For purposes of today's rule, source energy is further adjusted to account for the portion of electricity generated from fossil fuels by multiplying source energy times the fossil fuel generation factor and adding direct consumption of fossil fuels in the building. DOE did not ask for comment on this issue except as to whether the calculation could be effectively used for on-site combined heat and power systems (discussed

later). Nonetheless, DOE received several comments concerning the use of source energy rather than site energy.

NREC commented that site energy, which can be easily measured and verified, is the only correct method that can be used. (NREC, No. 28 at pp. 1-2) EEI stated that the use of source energy contradicts the 2007 final rule on energy efficiency performance standards for new Federal buildings, and urged DOE to use site energy. (EEI, No. 10 at p. 2) EEI stated that the use of source energy contradicts the conclusion of ASHRAE's Technology Council Ad Hoc Committee on Energy Targets, where ASHRAE, the American Institute of Architects (AIA), the U.S. Green Building Council (USGBC), and the Illuminating Engineering Society of North America (IESNA) agreed to use site energy as the metric for net-zero energy buildings. (EEI, No. 10 at pp. 4-5) EEI also claimed that the use of source energy will make the reduction targets unattainable. (EEI, No. 10 at p. 7) Finally, EEI argued that site energy metrics would eliminate any game playing or distorted results from the use of on-site renewable energy or CHP systems. (EEI, No. 10 at p. 6)

AGA commented in support of DOE's proposed use of source energy. Source energy, AGA stated, is essential to calculating fossil fuel use in both direct primary energy use and electric generation, and is consistent with the recommendations of the National Research Council on energy efficiency standards and measurement approaches, EPA's ENERGY STAR for Commercial Buildings, and national consensus standards such as the Green Buildings Initiative, ANSI standard and proposed IgCC Version 2.0 model code. (AGA, No. 16 at pp. 2-3) AGA recommended, for clarity, that the regulatory definitions include "source" energy. (AGA, No. 16

at p. 4)

GTI supported the use of source energy. They commented that site energy incentivizes lower first cost technologies and inadvertently promotes fuel switching away from more full-fuel-cycle energy efficient and lower greenhouse gas-emitting technologies. (GTI, No. 22 at pp. 5, 14) GTI also commented that the proposed DOE definition of primary energy only considers the energy required to convert fuels to electricity at the power plant, not the fossil fuel energy consumption associated with extraction, processing, transportation, or distribution of fuels used directly in buildings. (GTI, No. 22 at p. 2) GTI, APGA, and NPGA commented that DOE's proposed source energy metrics should be replaced with full-fuel-cycle information as DOE has decided to use in certain analyses the Department conducts when setting energy conservation standards for consumer products and commercial equipment. (see Docket No. EERE-2010-BT-NOA-0028, RIN 1904-AC24, Statement of Policy for Adopting Full-Fuel-Cycle Analyses into Energy Conservation Standards Program.) (GTI, No. 22 at p. 15; APGA, No. 17 at p. 3; NPGA, No. 23 at p. 3) GTI offered DOE's Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation (GREET) model as the primary energy to full-fuel-cycle conversion factor methodology, and its Source Energy and Emissions Analysis Tool (SEEAT) as its underlying methodology for consideration. (GTI, No. 22 at pp. 5-6)

DOE continues to believe that source energy is the correct metric to use for this rulemaking, for reasons cited in the NOPR and discussed at the beginning of this section. Because this rule relates to fossil fuel reductions specifically (rather than energy reductions generally) and not all electricity is produced from fossil fuels, it was necessary to go beyond site

energy and look at source energy to accurately quantify fossil fuel consumption for electricity. For this reason, DOE adjusted site energy from electricity by the percentage of electricity produced from fossil fuels (fossil fuel generation factor) and the fuel conversion, transmission, and distribution losses (electricity source energy factor) to determine the fossil fuel-generated energy consumption from electricity. The use of source energy is consistent with the approach EPA uses for ENERGY STAR Portfolio Manager. EPA has determined that source energy is the most equitable unit of evaluation for fossil fuels.¹ Source energy forms the basis for the maximum allowable fossil fuel-generated consumption reductions in Tables 1-4 in Appendix A.

Regarding EEI's concern that source energy would distort the results or cause game-playing with on-site renewable energy or CHP, this SNOPR gives on-site renewable energy generation the same benefit as improved energy efficiency. Under either scenario, the non-fossil fuel generation does not count toward the proposed design site electricity consumption. Similarly, any electricity produced by a CHP does not count toward the proposed design site electricity consumption. Regarding EEI's contention that source energy will make the reductions unattainable, DOE notes that if the reductions are not attainable via energy efficiency alone, Federal agencies may choose to use a renewable energy deduction.

DOE appreciates the comments from GTI and others about using a full-fuel-cycle approach with the GREET or SEEAT models, but believes the methods used in this rule are appropriate to address the statutory requirements. The maximum allowable fossil fuel-generated energy consumption targets in today's rule incorporate losses back to the power plant and the

¹ U.S. Environmental Protection Agency. ENERGY STAR Performance Ratings Methodology for Incorporating Source Energy Use. March, 2011.

pipeline. However, DOE does not believe it is necessary to go further upstream in its analysis for purposes of this rule. Any losses that occur further upstream than the power plant or pipeline would be very difficult to substantiate with precision.

4. Fuel Conversion Efficiency

In the NOPR, DOE proposed that the electricity source energy factor would be based on the average utility delivery ratio in Table 6.2.4 of the 2010 DOE Building Energy Data Book (See <http://buildingsdatabook.eere.energy.gov>). 75 FR 63410. The ratio accounts for fuel conversion losses to produce electricity, as well as transmission and distribution losses. DOE used the electricity source energy factor of 0.316 from the most recent year data was available, 2008. Recent updates in the 2011 DOE Buildings Energy Databook (see <http://buildingsdatabook.eere.energy.gov>) indicate that the current value in most current historical value in 2010 was 0.323, with a predicted gradual increase to 0.340 by 2035.

EEI commented that assuming a 33 percent conversion efficiency of fossil fuels to electricity will guarantee miscalculations, especially in areas with more renewable forms of electric generation. (EEI, No. 10 at p. 3) For example, the conversion efficiency of natural gas generation built over the last 10-15 years, has a thermal efficiency in the 55 to 57 percent range. (EEI, No. 7 Public Meeting Transcript, at p. 29; EEI, No. 10 at p. 3) AGA commented that DOE should not impose barriers to use of end-use fuel choice as a means of achieving target reductions. (AGA, No. 16 at p. 3) APGA and GTI commented that since generation efficiency and fuel mix will not materially change between now and 2030, it will be critical to reduce

purchased electricity consumption significantly to help achieve required targets. (APGA, No. 17 at p. 4; GTI, No. 22 at p. 2)

APGA commented that the proposed definition of primary energy is incomplete in that it only considers the energy required to convert fuels to electricity at the power plant, not primary energy resources necessary to obtain and transport the fuel to the power plant nor fossil fuel energy consumption associated with extraction, processing, transportation, or distribution of fuels used directly in buildings. (APGA, No. 17 at p. 3) APGA also commented that renewable generation requires fossil fueled backup, which will frustrate the 100 percent elimination of fossil fuel-generated energy consumption. (APGA, No. 17 at p. 6) DOD-N commented that the thermal efficiency factor has been omitted from the proposed calculation. (DOD-N, No. 25B at p. 3) IDEA commented that the definition of electricity source energy factor appears to be incorrect and should refer to “primary fuel” rather than “primary electrical energy.” (IDEA, No. 21 at p. 2)

First, DOE notes that thermal efficiency is embedded as part of electricity source energy factor, as well as the other fuel source energy multiplier. Further, DOE does not share the concern that the use of fossil fuels for backup power by a utility when intermittent renewable energy is not available will frustrate the 2030 goal of 100 percent reduction in the use of fossil fuel-generated energy. Compliance with the requirements leading up to 2030 (i.e., 55 percent in FY 2010-2014, 65 percent in FY 2015-2019, 80 percent in FY 2020-2024, and 90 percent in FY 2025-2029) is determined on an annual basis, and DOE believes it is reasonable to continue to apply that approach to the 100 percent reduction requirement after 2030. Even though fossil fuels

may be used by a utility as backup power during certain times of the day or year when a renewable resource is not available, surplus renewable energy provided at other times will offset fossil fuel consumption for use elsewhere.

In the NOPR, “primary electrical energy use” was a term used only in the definitions of “electricity source energy factor” and “fossil fuel consumption for electricity generation.” The latter term is not included in the today’s rule, and the definition of “electricity source energy factor” has been modified and no longer refers to “primary electrical energy use,” eliminating the need to redefine the term.

The definition of “electricity source energy factor” has been simplified in this proposed rule. Electricity source energy factor is defined as the multiplier used to account for fuel conversion losses and transmission and distribution losses associated with electricity generated from fossil fuels. For this proposed rule, the factor to be used is 0.316. This represents the average efficiency of fossil fuel generation in 2008 as described in the NOPR. The electricity source energy factor was used to help convert CBECS and RECS site energy data to source energy in Tables 1-4 of Appendix A as described in the preamble section on source energy.

EEI argued that it is inconsistent to use estimates for going “upstream” for electricity but not for direct use of fossil fuels. (EEI, No. 10 at p. 6) DOE has added an “other fuels source energy multiplier” to the equation for various fuels other than electricity to determine the fossil fuel-generated energy consumption of the proposed building. These multipliers were used by ORNL when converting the CBECS site energy use data to source-based fossil fuel generated

energy consumption, so the multipliers also need to be included in the calculation for the proposed building. The multipliers account for distribution and other losses that occur between the time the fuel provider takes delivery and final delivery to the building site as measured at the meter, and provides consistency with the adjustment for electricity. The “other fuels source energy multipliers” do not include well-head, mine-mouth, or bulk fuel transportation losses.

5. On-Site Energy Generation from Natural Gas

The NOPR indicated DOE’s interest in the effect of the fossil fuel-generated energy consumption reduction requirements on distributed energy technologies that provide onsite electrical generation from natural gas, such as combined heat and power (CHP) systems to generate both heat and electricity. A building with a CHP system could potentially be an all-gas building in terms of utility purchases and would, therefore, be required to reduce natural gas consumption in accordance with the fossil fuel-generated energy consumption reduction requirements. DOE indicated its interest in minimizing the penalty or not discourage the use of on-site CHP systems, within the limits of the statutory language. DOE invited comments on how appropriate credit may be given for CHP systems through the compliance determination methodology. 75 FR 63410.

DOE received several comments related to distributed energy technologies. IDEA commented that district heating systems may use a mix of fossil fuels and renewable fuels and may also supply electricity to the power grid using combined heat and power (CHP), and that the rule does not accurately capture the efficiency of district energy. (IDEA, No. 21 at p. 2) EEI

disagreed that on-site CHP has inherent efficiencies compared to purchased electricity; CHP can be very efficient, but it is not always more efficient than combined-cycle generation. (EEI, Public Meeting Transcript, No. 7 at pp. 53-54) EEI also commented that one of the issues is the on-site production of energy, whether it is electric energy, thermal energy or fossil fuel energy. (EEI, Public Meeting Transcript, No. 7 at p. 51) On a related issue pertaining to on-site generation more broadly, EEI commented that the use of on-site renewable energy does not change the energy efficiency of the building, it only moves the source of energy closer to the building. (EEI, No. 10 at p. 5)

NIBS commented that the logic behind singling out CHP systems seems flawed because their efficiency is already accounted for. (NIBS, No. 12 at p. 3) AGA commented that the direct use of natural gas in Federal buildings should be preserved as an option where installation of natural gas applications would both reduce fossil fuel-generated energy consumption and increase energy efficiency. (AGA, No. 16 at p. 2) NAD commented that fuel cells can operate on natural gas until hydrogen fuel storage becomes feasible, and suggested they should be addressed like CHP systems. (NAD, No. 19 at p. 3) AGA also commented that the calculation methodology correctly provides credit for the installation of on-site combined heat and power (CHP) systems, and suggested that DOE should promote these technologies within Federal buildings within the timeframes for which fossil fuel use is still permitted (i.e., before FY 2030). (AGA, No. 16 at p. 5)

DHHS-IHS-OEHE supported not penalizing or discouraging the use of on-site sources. (DHHS, No. 24 at p. 5) DOD-N commented that distributed electrical power produced on-site

should be credited with fossil fuel use avoidance for electricity sold into the grid. (DOD-N, No. 25B at p. 5) IDEA recommended the addition of eight definitions and amendment of the definition of “Proposed Design Fossil Fuel-Generated Energy Consumption” and the definition of “Direct Fossil Fuel Consumption.” (IDEA, No. 21 at pp. 3-4)

Based on the comments received and a technical review of the issues raised, DOE proposes specificity on how CHP and district heating systems should be considered. DOE believes that this specificity adds clarity and addresses the comments submitted. Under DOE’s proposal for district heating or cooling systems using fossil fuel as the source, the fossil fuel-generated energy consumption would be determined by adjusting the building load for the plant fuel conversion efficiency and estimated distribution losses as reflected in the “Other Fuels Energy Source Multiplier.” If a non-fossil fuel is used as the sole source (e.g., geothermal) of energy for the district heating system, there would be no contribution to fossil fuel-generated energy consumption.

For CHP district heating systems, the electricity attributed to the proposed building would be determined by multiplying the building’s pro-rated share of the total delivered heat from the system times the total electricity produced by the CHP system. For CHP systems serving only one building, fossil fuel consumption of the CHP system would be added to the direct fossil fuel consumption in Equation 1. Because it is produced from waste heat, the amount of electricity produced by either the CHP system serving a single building or a CHP district heating system, as determined above, would be deducted from the proposed design site electricity in Equation 1 under the renewable energy and CHP deduction.

6. Additional Review

Because of the complexity of some of the issues presented in the NOPR, two comments were submitted requesting an additional opportunity to review the rule before it is finalized, especially regarding the issues of climate zones and regional considerations. (NPGA, No. 23 at p. 5; DHHS, No. 24 at p. 1) This SNOPR provides an opportunity for additional comment on the proposed rulemaking, including the issues of climate zones and regional considerations.

7. Other

DOE received a few additional comments relating to methodology that did not fit into one of the categories above. AGA and APGA asked DOE not to achieve reductions by encouraging Federal agencies to only use electricity supplied by nuclear energy rather than renewable energy. (AGA, No. 16 at p. 2; APGA, No. 17 at p. 6) The American Wood Council (AWC) commented that DOE should reference not only LEED as a tool for energy reductions, but also Green Globes and the National Association of Home Builders (NAHB) Standard. (AWC, No. 18 at p. 2) DOE notes that all nuclear power is produced by regulated utilities and there is no mechanism for utility customers to get credit for nuclear-generated electricity under today's rule. There is currently no way for a non-utility to purchase nuclear-generated electric power as there is for electricity produced from renewable energy sources under arrangements like PPAs or RECs. However, DOE does recognize that on-site deployment of small modular reactors (SMRs) may be possible in the future and that some agencies may be in a position to

rely on SMRs for energy. DOE requests comment on how the potential future use of on-site SMRs could be addressed in the final rule.

DOE acknowledges that, to the extent LEED is referenced as a possible resource for fossil fuel reductions, it should have also referenced other green building rating systems (GBRS) such as Green Globes and the NAHB Green Standard. Although DOE has added these GBRS in the Reference Resources section below, DOE notes that these systems do not provide specific guidance that could help designers achieve the level of reductions called for in today's rule.

E. Petitions for Downward Adjustment

Upon petition by an agency subject to the statutory requirements, ECPA permits DOE to adjust the applicable numeric fossil fuel-generated energy consumption percentage reduction requirement downward with respect to a specific building, if the head of the agency designing the building certifies in writing that meeting the requirement would be technically impracticable in light of the agency's specified functional needs for the building and DOE concurs with the agency's conclusion. (42 U.S.C. 6834(a)(3)(D)(i)(II)) ECPA further directs that such an adjustment does not apply to GSA. In today's rulemaking, DOE proposes a downward adjustment process for new construction and separate processes for major renovations that are whole building renovations and for major renovations that are limited to system or component level renovations.

1. Technical Impracticability and Cost as a Basis for Downward Adjustment

The NOPR noted that the downward adjustment provision of ECPA does not expressly include cost considerations, but that DOE was considering incorporating cost considerations as part of a “technically impracticable” determination. Cost would not be the sole rationale for a determination of “technically impracticable,” but high costs could be part of the evaluation. 75 FR 63412. DOE invited comments on what kind of technical impracticability would constitute grounds for a petition for downward adjustment.

DOE received several comments about allowing costs (or cost-effectiveness) as grounds for a petition for downward adjustment. DOD-OUSOD and DOD-AF commented that life-cycle cost-effectiveness should be the foundation for any finding of “technically impracticable.” (DOD-OUSOD, No. 25A at p. 1; DOD-AF, No. 25C at p. 7) NIBS commented that any petition invoking cost as a basis for technical impracticability should be based solely on life-cycle costs, not first costs. (NIBS, No. 12 at p. 4) AGA recommended that petitions should be “technologically feasible and economically justified” as the term is used in ECPA. It also recommended that cost-effectiveness be based on life-cycle cost-effectiveness of the relevant energy reduction measures. (AGA, No. 16 at p. 3)

NRDC commented that DOE's proposal to use “cost considerations” as part of the determination of what is “technically impracticable” is contrary to what NRDC reads as EISA’s plain language, and that DOE should not use cost impacts in any way to limit the application of the rule. (NRDC, No. 14 at p. 8) NRDC stated that by requiring these reductions in fossil fuel use regardless of costs, Congress was advancing a broader goal that goes beyond the reduction of

fossil fuel use by Federal buildings, specifically that the Federal government will lead by example. (NRDC, No. 14 at p. 9)

DOE understands the concern that achieving the reductions required by this rulemaking, especially in the out-years, could be difficult and expensive. DOE also appreciates the concern that allowing costs as the basis for a downward adjustment petition could result in many agencies requesting a petition simply based on cost. The statutory provision concerning a petition for downward adjustment states that agencies must demonstrate that meeting the reductions would be technically impracticable “in light of the agency’s specified functional needs for the building,” and does not mention cost. As a result, DOE does not believe that cost itself could be grounds for a downward adjustment. However, DOE believes that it would be appropriate and permissible to consider a petition for downward adjustment based on the impact to an agency’s functional needs for the building of achieving the fossil fuel-generated energy consumption reductions. DOE recognizes that an agency’s functional needs for a building may be inextricably linked with costs, but cost should not be the primary basis for a petition for downward adjustment.

2. Bundling of Petitions

The bundling of petitions was not an issue addressed in the NOPR. However, three comments were submitted on whether an agency could submit a single petition for downward adjustment for multiple agency buildings of the same building type, rather than requiring a petition for each building separately, to minimize agency burden. (DOD-AF, No. 25C at p. 8;

DOD-OUSOD, No. 25A at p. 1; DHHS, No. 24 at p. 6)

DOE agrees that “bundling” of petitions by an agency for buildings of the same building type and function would help streamline the petitioning process and relieve the burden on agencies and DOE by avoiding duplication of effort. Although DOE would require an individual petition containing the information required under this proposed rule for each building, if the petitions for similar buildings are submitted jointly, a petition may reference the downward adjustment justification in another petition in the bundle. DOE is considering allowing agencies to bundle petitions for new buildings or whole renovations to buildings: (1) that are of the same building type and of similar size; (2) that are being designed and constructed to the same set of targets for fossil fuel-generated energy consumption reduction; or (3) that would require similar measures to reduce fossil fuel-generated energy consumption and similar adjustment to the numeric reduction requirement. The bundled petitions should clearly state any differences between the buildings, and explain why the differences do not warrant the submission of separate evaluations. If an agency is designing a similar building for a different set of targets for fossil fuel-based energy consumption reduction that meets conditions (1) and (3) above, the agency would be required to submit a separate petition, but may include the evaluation for the previous building(s) as well as an explanation why that earlier evaluation should apply to the new building(s).

For component-level major renovations, DOE is considering allowing bundling petitions that are of the same component and building type. DOE is accepting comment on the most efficient yet effective ways to bundle petitions.

3. DOE Review Process

The NOPR stated that DOE will review petitions in a timely manner and if the petitioning agency has successfully demonstrated the need for a downward adjustment per the discussion above, DOE would concur with the agency's conclusion and notify the agency in writing. If DOE does not concur, it would forward its reasons to the petitioning agency with suggestions as to how the fossil fuel-generated energy consumption percentage reduction requirement may be achieved. 75 FR 63412.

Several comments were submitted about the DOE review process. EEI, ICC, DOD-OUSOD, and DOD-N requested information on how quickly the Secretary of Energy has to render a decision on a petition, and requested a timeline. (EEI, Public Meeting Transcript, No. 7 at p. 61; ICC, No. 11 at p. 3; DOD-OUSOD, No. 25A at p.1; DOD-N, No. 25B at p. 7) NRDC and DOD-OUSOD commented that DOE should establish procedures for reviewing and ruling on petitions for adjustments to ensure public transparency. (NRDC, No. 14 at p. 7; DOD-OUSOD, No. 25A at p. 1) DOD-N recommended that the rule should include where and how to submit petitions. (DOD-N, No. 25B at p. 7)

DOE recognizes that agencies want assurance that DOE will respond to petitions in a timely manner to avoid project delays. For petitions for new construction, DOE proposes to notify an agency in writing within 90 days of submittal whether a petition for downward adjustment is approved or rejected. If DOE rejects the petition, it would include its reasons for

doing so in its response to the agency. Additionally for new construction, DOE proposes a provision under which DOE could establish an adjusted value other than the one presented in a petition if DOE finds that the petition does not support the conclusion of the submitting agency but that the statutorily required level was nonetheless technically impractical in light of the agency's specific functional needs for the building. This provision is intended to provide flexibility in the petition process and reduce the need for agencies to resubmit in the instance of a rejection. Under the statute, the Secretary of Energy is tasked with deciding whether to grant a petition for downward adjustment and DOE believes that this authority also grants DOE the ability to propose alternative adjusted values if appropriate.

For petitions for downward adjustments to the requirements applicable to major renovations, DOE proposes that the downward adjustment would be granted upon submission of specified certifications. The necessary certifications are discussed in greater detail further in this document.

4. Information Required in Petitions for New Construction

The NOPR proposed that a petition for downward adjustment of the numeric requirement should include an explanation of what measures would be required to meet the fossil fuel-generated energy consumption reduction requirement, and why those measures would be technically impracticable in light of the agency's specified functional needs for the building. DOE also proposed that the petition should demonstrate that the adjustment requested by the agency represents the largest feasible reduction in fossil fuel-generated energy consumption that can reasonably be achieved. DOE solicited comments on those issues. 75 FR 63412.

Several comments specifically asked what kind of information would be required for a petition. DOD-N recommended that DOE provide guidance regarding expected content of petitions and the minimum supporting information required for review and approval. (DOD-N, No. 25B at p. 7) NRDC recommended that DOE require that the agency provide in its petition any relevant information that is needed to understand and verify the agency's conclusion and request, including information about the building's specified functional needs. (NRDC, No. 14 at p. 12) NRDC thought the requirement that a petition demonstrate that the requested adjustment is the largest feasible reduction in fossil fuel-generated consumption that can be achieved represents a positive step. (NRDC, No. 14 at p. 8) NIBS suggested that the petitions include a description of all reasonable technologies and practices that were examined and ultimately rejected by the design team. (NIBS, No. 12 at p. 4)

DOE agrees with these comments and is proposing provisions intended to provide more detailed petition requirements that would allow the Department to determine more comprehensively whether a downward adjustment would be allowable. DOE proposes a modified provision to require a demonstration that the requested adjustment represents the largest feasible fossil fuel reduction that can reasonably be achieved to include a demonstration that all life-cycle cost-effective energy efficiency and on-site renewable energy measures were included in the design and a description of the technologies and practices that were evaluated and rejected, including a justification why they were not included. Finally, agencies would also be permitted to provide additional information they think will help justify the request for downward adjustment.

Petitions would also be required to include the maximum allowable fossil fuel-generated energy consumption for the proposed building, the estimated fossil fuel-generated energy consumption of the proposed building, and a description of the building and the building energy systems. A description of the building would include, but would not be limited to, location, use type, floor area, stories, and functional needs of the building, and any other information the agency deems pertinent. The building energy systems to be described would include the building envelope, HVAC systems, lighting systems, service water heating system, and estimated receptacle and plug loads. This information should provide DOE the necessary information to review petitions, and help agencies ensure key questions and options are addressed in the design process.

5. Downward Adjustments for Major Renovations

As noted previously, for major renovations DOE proposes that the fossil fuel reduction requirements apply only to the energy use associated with the portions of the building or building systems that are being renovated and only to the extent that the scope of the renovation provides an opportunity for compliance with the applicable fossil fuel-generated energy consumption reduction requirements. DOE recognizes that the improved efficiencies that can be achieved through renovation may not provide sufficient reduction of fossil fuel-generated energy use for a major renovation to meet the interim requirements. Renovations are even less likely to achieve a 100 percent-reduction, even in the limited context of the energy use associated with just the renovated system or component. As such, DOE expects that to the extent that renovations would

be subject to the requirements, agencies would need to apply for downward adjustments.

The SNOPR differs from the NOPR by establishing a separate section and separate requirements for downward adjustments for major renovations, and further delineates between major renovations that are whole building renovations and major renovations that are limited to system or component level retrofits (e.g., a lighting retrofit, a retrofit of a boiler or chiller). Whole building retrofits provide a greater opportunity for improved energy efficiency as compared to a system or component level retrofit, but generally neither type of retrofit would likely provide an opportunity to meet the fossil fuel reduction requirements. Recognizing the practical limitations on improving energy efficiency through retrofits, DOE proposes separate downward adjustment processes for major renovations. For major renovations that are whole building renovations, a downward adjustment would be provided at a level equal to the energy efficiency level that would be achieved were the proposed building designed to meet the energy efficiency standard applicable to new construction. As directed by ECPA, this downward adjustment would not apply to GSA, although DOE proposes that this adjustment would be available to GSA-tenant agencies with significant control over building design.

The energy efficiency standards for new construction are established in 10 CFR part 433, for commercial and multi-family high-rise residential buildings, and 10 CFR part 435, for low-rise residential buildings. The energy efficiency standards require a building be designed to achieve the energy efficiency levels of the applicable referenced voluntary consensus code: ASHRAE 90.1 for commercial buildings multi-family high-rise residential buildings, and IECC for low-rise residential buildings. The energy efficiency standards for new Federal buildings

further require that buildings be designed to achieve energy efficiency levels that are at least 30 percent beyond the levels established in the referenced codes, if life-cycle cost-effective. As proposed, a building undergoing a whole building renovation would need to be designed to achieve the energy efficiency levels currently applicable only to new construction. DOE has preliminarily determined that achieving the specified level of energy efficiency for a major retrofit that is a whole building retrofit would represent the appropriate level of fossil fuel-generated energy reduction for the building efficiency that is also technically practicable.

For major renovations that are limited to system or component level retrofits, DOE proposes to provide downward adjustments at a level equal to the energy efficiency level that would be achieved through the use of commercially available systems and/ or components that provide a level of energy efficiency that is life-cycle cost effective. The energy efficiency requirement for system and component level renovations could be demonstrated by using the higher efficiency of the following, (1) ENERGY STAR or FEMP designated products, or (2) products that meet the energy efficiencies specified in ASHRAE 90.1 for systems and components in commercial buildings, or IECC for systems and components in residential buildings.

In setting efficiency requirements, both FEMP and ENERGY STAR choose levels that are among the highest 25 percent of efficiency for a given product category. ENERGY STAR estimates that its program saves more than 200 billion kWh of electricity each year, and FEMP estimates that compliance with its efficiency requirements can save the government more than 30 trillion BTUs each year. Both programs have integrated life-cycle cost effectiveness into their

guiding principles and, as such, Federal buyers can have confidence that required products have both good energy performance and a total cost of ownership that is equal to or less than products below set efficiencies. Prescriptive requirements of ASHRAE 90.1 and IECC demonstrate similarly high levels of efficiency. Together, these requirements cover more than 70 product types and will help ensure that the products used within Federal facilities are among the highest energy efficiencies available. Federal buildings that install and use these products will realize lower energy intensities compared to using non-compliant products.

DOE requests comment on the considered approach as well as comment on other potential methods for processing requests related to major renovations.

6. Make Information Publicly Available

DOE received some comments that petitions for downward adjustment should be made publicly available on a DOE website. (NRDC, No. 14 at p. 11; Form letter, No. 29 at p. 1) This issue was not addressed in the NOPR. The Form Letter comments also stated that Federal agency compliance with today's SNOPR should be made public. (Form letter, No. 29 at p. 1)

Commenters stated that the reasons for making this information publicly available are that it would make the process transparent and hold agencies accountable and could reduce unsupported petitions. DOE appreciates the commenters concerns and supports transparency to the extent the Department can be transparent while also responding to petitions in a short timeframe so as not to delay building design and construction. As a result, DOE is proposing

reporting petition summary level information in the DOE Annual Report to Congress on Federal Energy Management and Conservation Programs (See <http://www.energy.gov/about/budget.htm>).

7. Narrow the Use of Petitions

DOE received a few comments related to narrowing the use of petitions for downward adjustment. NRDC commented that in developing the test for technical impracticability and the standards for downward adjustment petitions, DOE must consider the statutory context of the EISA 2007 provision, which demonstrates that DOE should not craft a broad petition procedure that swallows the larger statutory requirement. (NRDC, No. 14 at p. 8) The Form Letter requested that DOE promulgate strict requirements that ensure that agency requests for fossil fuel reduction adjustments will be rarely granted, so that this process does not prevent the law from achieving its vital goal to cut government buildings' greenhouse gas emissions dramatically. The Form Letter also urged DOE to strengthen the rule and apply it without exceptions and without loopholes. (Form letter, No. 29 at p. 1)

DOE believes the changes it has proposed in this SNOPR would reduce the number of petitions submitted for downward adjustment and will improve the content of submitted petitions. DOE has expanded the number of building types covered in Tables 1-4 in Appendix A of part 433, and has a methodology for calculating the maximum allowable fossil fuel-generated consumption values for buildings with process loads. This is expected to greatly reduce the number of building types without baselines and fossil fuel reduction targets, eliminating a

significant potential source of petitions. In addition, in response to some of the public comments received, this proposed rule is more specific about information to be provided as part of the petition process. Agencies requesting a petition would be required to: (1) demonstrate that the requested adjustment represents the largest feasible fossil fuel reduction that can be achieved; (2) demonstrate that all cost-effective energy efficiency and on-site renewable energy has been included in the proposed design; and (3) describe all technologies and practices that were evaluated and rejected, including a justification as to why they were not included in the design. The rule would require specific information about the energy efficiency and on-site renewable energy measures included in the proposed building design to enable DOE to evaluate the request for downward adjustment.

8. GSA Tenant Agencies

The statute does not provide the General Services Administration (GSA) the option of petitioning DOE for a downward adjustment of the applicable percentage reduction requirement. (42 U.S.C. 6834(a)(3)(D)(i)(II)) In the NOPR, DOE proposed that a new Federal building or a Federal building undergoing major renovations for which a Federal agency is providing substantive and significant design criteria may be the subject of a petition. 75 FR 63412. Under this approach, DOE proposed that a GSA building that is designed to meet the specifications provided by a tenant agency may be considered for a downward adjustment if a petition is submitted by the head of the tenant agency.

DOE received one comment on this issue. NRDC commented that allowing GSA tenant

agencies to petition for downward adjustments contradicts the statute. (NRDC, No. 14 at p. 10)

While the statute prohibits GSA from petitioning DOE for a downward adjustment, it makes no reference to GSA tenant agencies. DOE is continuing to propose that GSA tenant agencies that have significant control over building design may request a petition. In such cases, it would be the tenant agency, not GSA, that is making the design choices that would allow for compliance with the rule. Allowing GSA tenant agencies to submit a petition for downward adjustment would provide an option for some buildings for which the required fossil fuel reductions may be technically impracticable in light of the building's functional needs, but for which GSA may not submit a petition.

9. Other

DHHS-HIS-OEHE commented that consideration for what is technically impracticable should include remote locations that often have limited choices in available power utility companies. (DHHS, No. 24 at p. 6) DOE will consider remote locations and the availability of power utility companies in the petition process, but DOE also notes that the use of allowable, off-site renewable energy sources would help agencies meet their targets even in the case of remote buildings.

F. Impacts of the Rule

1. Cost Impacts

The NOPR provided a discussion of the expected costs of meeting the fossil fuel-generated energy consumption reduction requirements based on a study that DOE commissioned by PNNL in 2008 to look at the incremental costs of high performance buildings, and cost calculations for DOE work associated with the ASHRAE Advanced Energy Design Guides. DOE acknowledged that cost data for high performance buildings is fairly rare, and many times the costs for achieving high levels of energy efficiency are intermingled with the costs to achieve more sustainable design features. 75 FR 63410. Because of the limited data, DOE sought comment on cost impacts, especially any construction cost increases for buildings that Federal agencies are in the process of designing or have already built.

DOE did not receive any comments providing additional specific cost information. EEI noted that the PNNL 2008 report stated that the cost data was very limited. (EEI, No. 10 at p. 8) NIBS stated that the focus on first costs is misplaced and should not be considered; DOE should focus on the overall life-cycle-cost of the requirements. (NIBS, No. 12 at p. 3) NRDC also stated that when analyzing cost impacts, DOE should look at life-cycle costs rather than increased first costs. (NRDC, No. 14 at p. 7) NRDC commented that past experience has shown that the cost of efficiency improvements tends to be lower than predicted and that the magnitude of increases in energy efficiency will often exceed expectations. In another comment, NRDC stated that the statute does not mention costs as one of the criteria for application of this rule; therefore, DOE should not use cost to limit the application of the rule. (NRDC, No. 14 at p. 6)

The AGA stated that the estimates should be based on actual quotes, not PNNL analyses

or the ASHRAE Advanced Energy Design Guides. (AGA, No. 16 at p. 5) APGA states that EISA 2007 Section 433 strongly discourages any use of natural gas and subsidizes the growth of non fossil-fueled electricity generation, the vast majority of which will likely be produced off-site. APGA believes that, under this interpretation, EISA 2007 may reduce initial construction costs (relative to onsite generation) and massively increase life-cycle operating costs for utility services. (APGA, No. 17 at p. 6) NAD commented that the cost analysis described in the proposed rules showed up to an 8.7 percent cost increase for a simple building, but this will increase dramatically for more complex buildings, especially for buildings built in the later years when fossil fuel reductions near 100 percent. (NAD, No. 19 at p. 3) The DOD-AF commented that given the restrictive nature of the Military Construction Program (MILCON) funding process, it is not clear how the Air Force can implement a strategy to meet this requirement within the timeline discussed and whether there is a budget to implement this requirement while meeting current and future Air Force mission needs. (DOD-AF, No. 25C at p. 6)

DOE agrees that it is prudent to consider cost-effectiveness of energy reduction measures. First costs, of course, are necessary to compute cost-effectiveness. DOE notes, however, that per the statute, high first costs/poor cost-effectiveness are not an explicit consideration for today's rulemaking. (See 42 U.S.C. 6834(a)(3)(D)) Nonetheless, DOE believes that minimizing costs to Federal agencies is a significant consideration, and DOE has designed this proposed rule to minimize costs and foster the most cost-effective approaches to meeting the statutorily mandated fossil fuel reductions.

The baseline Federal building energy efficiency standards published in the past few years

require agencies to design new Federal buildings to achieve energy consumption levels at least 30 percent below the levels of the baseline building built to ASHRAE Standard 90.1-2010, or the IECC 2009 (depending on the type of building), if life-cycle cost-effective. *See* 78 FR 40945 (July 9 2013); 76 FR 49279 (August 10, 2011). If achieving this consumption level is not life-cycle cost-effective, Federal agencies must, at a minimum, meet ASHRAE Standard 90.1-2007, or the IECC 2009 (depending on the type of building). Federal agencies are already required to incur the costs associated with meeting these requirements. For new Federal buildings, it is only the additional first cost of achieving fossil fuel-generated consumption reductions beyond the energy efficiency improvements already required for new Federal buildings that would be attributable to this proposed rule. Beyond those pre-existing requirements, agencies have the option of implementing additional energy efficiency, on-site renewable energy, or acquiring off-site renewable energy in accordance with procedures described earlier. The rule provides agencies with some alternative ways to achieve the required fossil fuel reductions, and DOE expects that agencies will select the most cost-effective combination of these options.

2. Other Impacts

DOE received several comments closely associated with cost impacts. A few commenters expressed concern that the rulemaking discourages or encourages the use of certain fuel types or other forms of energy without any consideration of the comparative efficiency and environmental impacts of optional fuel choices. (See AGA, No. 16 at p. 2; APGA, No. 17 at pp. 2-3) One commenter encouraged DOE to account for indirect social costs and another expressed concern that DOE might use the “social cost of carbon” in its cost/benefit analysis for this rule

(NRDC, No. 14 at p. 7; EEI, No. 10 at pp. 8-9)

Several comments were submitted questioning the technical and fiscal feasibility of meeting today's requirements, especially the 100 percent fossil fuel reduction requirement starting in FY 2030. (See AGA, No. 16 at p. 2; APGA, No. 17 at p. 2; NPGA, No. 23 at pp. 2, 4; GTI, No. 22 at p. 14; DOD-AF, No. 25C at p. 7; EEI, Public Meeting Transcript, No. 7 at p. 53)

DOE acknowledges that achieving the reductions, especially the 100 percent reduction in 2030, will be challenging. However, the reductions mandated today are established by statute. DOE expects design practices and technologies will improve and costs will decrease in coming years, making it easier and less costly to achieve reductions through either energy efficiency or the use of on-site renewable energy. If the reductions are technically impracticable in light of the agency's functional needs for the building after all of these provisions are implemented, as a last resort, Federal agencies (except for GSA) may petition the Secretary of Energy through the DOE's Federal Energy Management Program (FEMP) Director for a downward adjustment to the numeric reduction requirement.

Finally, DOE received several comments broadly supporting DOE's energy conservation and renewable energy efforts or other energy conservation or renewable energy efforts. Some of these comments supported or opposed the use of certain forms of renewable and fossil energy, others supported specific green building measures, and others encouraged green technology research. DOE actively supports the research and development of a wide range of forms of renewable energy and has chosen not to narrow the renewable energy deduction in this rule to

only certain forms of renewable energy. Many of the suggestions made by commenters are currently being implemented by DOE. Executive Orders 13423 and 13514 require Federal agencies to implement sustainable practices, GSA has established an Office of High Performance Green Buildings, and ECPA, as amended by EISA, requires sustainable design principles be applied to all new Federal buildings and major renovations of Federal buildings (42 U.S.C. 6834(a)(3)). Elsewhere in this issue of the **Federal Register**, the green building certification portion of the Sustainable Design NOPR is published as a final rule.

G. Guidance and Other Topics

DOE requested specific comment in the NOPR on what additional training would help agencies meet the reductions called for by this statute. In addition to comments on that question, DOE received several unique comments as part of the Form Letter about alternative generation, green buildings, and transportation.

1. Training

In the NOPR, DOE provided references to various tools to help agencies design new Federal buildings and major renovations to achieve the required fossil fuel reductions, and asked for comments on additional training or tools that might be helpful. 75 FR 63413.

NIBS confirmed the importance of an experienced and well-trained design team. (NIBS,

No. 12 at p. 4) AIA commented that improvement of energy modeling tools and creation of early-design phase tools is necessary. AIA mentioned the need to train architects, engineers and other building design professionals to meet these energy targets. They also mentioned the need to train building owners, facility managers and inhabitants on operations and maintenance. AIA also recommended examining tools being used for building analysis. (AIA, No. 15 at p. 2) DOD-OUSOD commented that additional training should cover reconciliation of force protection/security requirements with sustainable design. (DOD-OUSOD, No. 25A at p. 3) ICC endorsed the listing of resources including the International Green Construction Code and ASHRAE 189.1. (ICC, No. 11 at p. 3) NRDC commented that DOE should look at real data and survey other agencies to understand what would make the reduction requirement “technically impracticable” and look at the technology available now and consider the technology in development, to answer this question. This would allow DOE to target resources to assist agencies in meeting the requirements for future years, when greater reductions in fossil fuel usage will be required. (NRDC, No. 14 at p. 8)

DOE agrees about the importance of training and tools to help improve the ease and effectiveness of designing high-performance buildings. DOE develops, and will continue to develop, tools and training. This will include looking at real data and surveying agencies on new technologies and experience with high performance building practices, including compliance with the fossil fuel reduction requirements. DOE agrees it is important to reconcile force protection/security requirements with energy and sustainable design considerations, and will work with agencies to do so.

As FEMP did with the existing Federal building energy efficiency standards, FEMP plans to hold webcasts on the new Federal baseline energy efficiency standards, and today's fossil fuel reduction rule. FEMP currently keeps all material related to the Federal standards at http://www1.eere.energy.gov/femp/regulations/notices_rules.html. FEMP also has training available on all aspects of Federal energy management and conservation at <http://apps1.eere.energy.gov/femp/training>.

In addition to the tools identified in the NOPR and the FEMP tools listed above, DOE is also referencing additional resources in the next section of this document.

2. Verification and Monitoring

NRDC recommended that a design verification and commissioning plan be part of the building design to help ensure the required reductions. They also suggested that a requirement be included for continued measurement and monitoring of Federal buildings with mandatory reporting and disclosure to the public. (NRDC, No. 14 at p. 16)

DOE agrees that both building commissioning and verification of performance are important to ensure buildings perform as designed to achieve the required fossil fuel-generation energy consumption reductions. ECPA, however, provides that new Federal buildings and major renovations of Federal buildings shall be "designed" so that fossil fuel-generated energy consumption is reduced. As such, the rulemaking only covers the building design, not post-occupancy. EISA section 432, however, requires that Federal agencies report and benchmark

energy and water use for at least 75 percent of facility energy use. (42 U.S.C. 8253(f)) Agencies should refer to “Building Energy Use Benchmarking Guidance,” <http://www1.eere.energy.gov/femp/regulations/guidance.html>, for information and guidance on these requirements.

IV. Reference Resources

DOE has prepared a list of resources to help Federal agencies address the reduction of fossil fuel-generated energy consumption. The final rule on energy efficiency published in the **Federal Register** on December 4, 2006 (71 FR 70275) contains some reference resources for energy efficiency improvement in building design. These resources come in many forms such as design guidance, case studies and in a variety of media such as printed documents or on Web sites. The resources for energy efficiency improvement will also provide guidance for fossil fuel-generated energy consumption reductions.

DOE is adding to this list of resources to also include:

- U.S. Department of Energy, Federal Energy Management Program. (www1.eere.energy.gov/femp). FEMP provides access to numerous resources and tools that can help Federal agencies improve the energy efficiency of new and existing buildings.
- U.S. Department of Energy, Building Technologies Program. Database of high-performance buildings. (eere.buildinggreen.com).

- FedCenter. High Performance Buildings. (www.fedcenter.gov/programs/greenbuildings/).
- American Society of Heating, Refrigerating, and Air-conditioning Engineers, Inc.
 “Advanced Energy Design Guides.” (<http://www.ashrae.org/technology/page/938>) and (http://www1.eere.energy.gov/buildings/commercial_initiative/guides.html). The ASHRAE “Advanced Energy Design Guides (AEDGs),” developed in cooperation with DOE and others, are a series of publications designed to provide recommendations for achieving energy savings 30 percent better than the minimum code requirements of ANSI/ASHRAE/IESNA 90.1-2004, and cover K–12 school buildings, small retail buildings, small office buildings, small hospitals and healthcare facilities, highway lodging, and small warehouses and self-storage buildings. Additional design guides aimed at establishing 50 percent energy savings over the minimum code requirements of ANSI/ASHRAE/IESNA 90.1-2004 are being developed for small-to-medium office buildings, mid-box retail, highway lodging, K–12 schools, grocery/supermarket, and quick-serve restaurants.
- American Society of Heating, Refrigerating, and Air-conditioning Engineers, Inc.
 ANSI/ASHRAE/IESNA Standard 189.1 Standard for the Design of High-Performance Green Buildings. (www.ashrae.org/publications/page/927).
- Tangherlini, Daniel, Administrator, General Services Administration, Letter to Secretary Ernest Moniz, U.S. Department of Energy, GSA recommendations and review of green building certification systems, October 25, 2013.
 (http://www.gsa.gov/portal/content/131983?utm_source=OGP&utm_medium=print-radio&utm_term=gbcertificationreview&utm_campaign=shortcuts).

- National Institute of Building Sciences. “Whole Building Design Guide.”
(www.wbdg.org).
- International Code Council. “International Green Construction Code.”
(www.iccsafe.org/cs/IGCC/Pages/default.aspx).
- Northwest Energy Efficiency Alliance, Better Bricks Commercial Building Initiative,
(www.betterbricks.com).
- Massachusetts High Performance Buildings Database. (mtc.buildinggreen.com).
- New Buildings Institute. Buildings Database. (buildings.newbuildings.org).
- Environmental Building News. BuildingGreen.com. (www.buildinggreen.com)
(subscription required).

V. Procedural Issues and Regulatory Review

A. Review under Executive Orders 12866 and 13563

It has been determined that this regulatory action is a “economically significant regulatory action” under section 3(f)(1) of [Executive Order 12866](#). Accordingly, section 6(a)(3) of the Executive Order requires that DOE prepare a regulatory impact analysis (RIA) on this proposed rule and that the Office of Information and Regulatory Affairs (OIRA) in the OMB review this proposed rule. DOE has also reviewed this regulation pursuant to Executive Order 13563, issued on January 18, 2011. 76 FR 3281 (January 21, 2011). EO 13563 is supplemental to and explicitly reaffirms the principles, structures, and definitions governing regulatory review established in Executive Order 12866.

The RIA consists of: (1) A statement of the problem addressed by this regulation, and the mandate for government action; (2) a description and analysis of the feasible policy alternatives to this regulation; (3) a quantitative comparison of the impacts of the alternatives; and (4) the national economic impacts of the proposed standards.

The RIA calculates the effects of feasible policy alternatives to mandatory standards for new Federal buildings and major renovations subject to the requirements, and provides a quantitative comparison of the impacts of the alternatives. DOE evaluated each alternative in terms of its ability to achieve significant energy savings at reasonable costs, and compared it to the effectiveness of the proposed rule.

DOE identified the following major policy alternatives for achieving increased energy efficiency:

- No new regulatory action;
- “Zero fossil fuel” alternative of immediately requiring the lowest fossil fuel-generated energy consumption limits specified in the rule of zero fossil fuel usage; and
- The proposed approach.

DOE also considered certain non-regulatory policy alternatives such as tax credits, rebates, and labeling programs, and was unable to identify any non-regulatory policy alternatives that would be viable for Federal buildings. DOE evaluated the alternatives in terms of cost and energy savings.

Table V-1 Construction Cost Increases under the Fossil Fuel-Reduction Rule and “Zero Fossil Fuel” Alternative (relative to baseline “no-action” alternative) Calendar Years 2015-2044

Calendar Year	Fossil Fuel-Reduction Rule - High PV¹ Cost Scenario (2012 \$million)	Fossil Fuel-Reduction Rule - Low PV Cost Scenario (2012 \$million)	“Zero Fossil Fuel” Alternative - High PV Cost Scenario (2012 \$million)	“Zero Fossil Fuel” Alternative - Low PV Cost Scenario (2012 \$million)
2015	\$30	\$30	\$1,194	\$1,136
2016	\$30	\$30	\$1,189	\$1,103
2017	\$30	\$30	\$1,183	\$1,071
2018	\$30	\$30	\$1,178	\$1,040
2019	\$30	\$30	\$1,173	\$1,010
2020	\$536	\$447	\$1,191	\$1,005
2021	\$534	\$435	\$1,186	\$976
2022	\$532	\$424	\$1,181	\$949
2023	\$530	\$413	\$1,175	\$922
2024	\$528	\$402	\$1,170	\$896
2025	\$841	\$618	\$1,165	\$871
2026	\$837	\$601	\$1,160	\$847
2027	\$834	\$585	\$1,155	\$824
2028	\$830	\$569	\$1,150	\$801
2029	\$827	\$554	\$1,145	\$778
2030	\$1,135	\$736	\$1,140	\$757
2031	\$1,130	\$716	\$1,140	\$757
2032	\$1,125	\$696	\$1,140	\$757
2033	\$1,120	\$677	\$1,140	\$757
2034	\$1,115	\$658	\$1,140	\$757
2035	\$1,110	\$640	\$1,140	\$757
2036	\$1,110	\$640	\$1,140	\$757
2037	\$1,110	\$640	\$1,140	\$757
2038	\$1,110	\$640	\$1,140	\$757
2039	\$1,110	\$640	\$1,140	\$757
2040	\$1,110	\$640	\$1,140	\$757
2041	\$1,110	\$640	\$1,140	\$757
2042	\$1,110	\$640	\$1,140	\$757
2043	\$1,110	\$640	\$1,140	\$757
2044	\$1,110	\$640	\$1,140	\$757

¹ “PV” references solar photovoltaic technologies.

Table V-2 Annualized Benefits and Costs to Federal Government for New and Existing Construction under the Fossil Fuel-Reduction Rule^(a)

		Primary Estimate ^(b)	Low Estimate ^(b)	High Estimate ^(b)
		Monetized (2012 \$million/year)		
Discount Rate				
Benefits				
Operating (Energy) Cost Savings	7%	349.2	336.1	468.9
	3%	606.7	580.1	841.4
CO ₂ Reduction at \$12.9/t ^(c)	5%	46.0	46.0	46.0
CO ₂ Reduction at \$40.8/t ^(c)	3%	178.6	178.6	178.6
CO ₂ Reduction at \$62.2/t ^(c)	2.50%	270.6	270.6	270.6
CO ₂ Reduction at \$117.0/t ^(c)	3%	550.9	550.9	550.9
NO _x Reduction at \$2,639/t ^(c)	7%	2.9	2.9	2.9
	3%	4.9	4.9	4.9
Total (Operating Cost Savings, CO ₂ Reduction and NO _x Reduction) ^(d)	7% plus CO ₂ range	398 to 903	385 to 890	518 to 1023
	7%	530.7	517.6	650.4
	3%	790.2	763.6	1024.9
	3% plus CO ₂ range	658 to 1163	631 to 1136	892 to 1397
Costs				
Incremental Purchase Price Increase	7%	479.4	572.6	386.3
	3%	574.6	695.6	453.5
Net Benefits/Costs				
Total (Operating Cost Savings, CO ₂ Reduction and NO _x Reduction, Minus Incremental Cost Increase to Buildings)	7% plus CO ₂ range	-28 to 477	-188 to 317	132 to 636
	7%	104.6	-55.0	264.2
	3%	215.7	68.0	571.4
	3% plus CO ₂ range	187 to 692	-65 to 440	439 to 944

- (a) Incremental costs are calculated for buildings constructed or renovated in 2015-2044; total benefits extend through 2074.
- (b) The primary, low, and high estimates utilize forecasts of energy prices from the *Annual Energy Outlook 2013* reference case. The low and high cases were based upon the percentage price deviations from the *Annual Energy Outlook 2013* reference case as provided in the Low Economic Growth case and High Economic Growth case, respectively.
- (c) These values represent global values (in 2012\$) of the social cost of CO₂ (SCC) emissions in 2013 under several scenarios developed by the Interagency Working Group on Social Cost of Carbon (SCC) (OMB 2013). The values of \$12.9, \$40.8, and \$62.2 per metric ton are the averages of SCC distributions calculated using 5%, 3%, and 2.5% discount rates, respectively. The value of \$117.0 per ton represents the 95th percentile of the SCC distribution calculated using a 3% discount rate. For NO_x, values were extracted from OMB guidance (OMB 2006) and updated to 2012\$. An average value (\$2,639) of the low (\$468) and high (\$4,809) values was used.
- (d) Total monetary benefits for both the 3-percent and 7-percent cases utilize the central estimate of social cost of NO_x and CO₂ emissions calculated at a 3-percent discount rate (averaged across three integrated assessment models (IAMs)), which is equal to \$40.8/metric ton (in 2012\$).

Primary, low, and high estimates of the benefits and costs were developed to indicate the possible range of these metrics. The future energy prices used to compute operating cost savings for the primary estimate were taken from the *Annual Energy Outlook 2013* reference case. The low estimate combines slightly *lower* energy prices as compared to the reference case along with the construction cost developed as part of the *high*-cost PV case (used for incremental construction cost). Alternatively, the high estimate combines *higher* energy prices relative to the reference case along with the construction cost developed as part of the *low*-cost PV case. The average incremental construction cost based upon the high-cost PV case and the low-cost PV case was used as the primary estimate of incremental construction cost.

Table V-3. Annualized Benefits and Costs to the Federal Government for New and Existing Construction under the “Zero Fossil Fuel” Alternative^(a)

	Discount Rate	Primary Estimate ^(b)	Low Estimate ^(b)	High Estimate ^(b)
		Monetized (2012 \$million/year)		
Benefits				
Operating (Energy) Cost Savings	7%	601.4	583.1	781.2
	3%	1076.6	893.6	1259.6
CO2 Reduction at \$12.9/t(c)	5%	68.6	68.6	68.6
CO2 Reduction at \$40.8/t(c)	3%	257.9	257.9	257.9
CO2 Reduction at \$62.2/t(c)	2.50%	388.0	388.0	388.0
CO2 Reduction at \$117.0/t(c)	3%	793.2	793.2	793.2
NO _x Reduction at \$2,639/t ^(c)	7%	4.8	4.8	4.8
	3%	7.1	7.1	7.1
Total (Operating Cost Savings, CO ₂ Reduction and NO _x Reduction) ^(d)	7% plus CO ₂ range	675 to 1399	657 to 1381	855 to 1579
	7%	864.1	845.8	1043.8
	3%	1341.6	1158.6	1524.7
	3% plus CO ₂ range	1152 to 1877	969 to 1694	1335 to 2060
Costs				
Incremental Purchase Price Increase	7%	1043.8	1167.0	920.6
	3%	1021.6	1161.1	882.2
Net Benefits/Costs				
Total (Operating Cost Savings, CO ₂ Reduction and NO _x Reduction, Minus Incremental Cost Increase to Buildings)	7% plus CO ₂ range	-288 to 436	-510 to 214	-66 to 659
	7%	-99.0	-321.2	123.2
	3%	320.0	-2.5	642.5
	3% plus CO ₂ range	131 to 855	-192 to 533	453 to 1178

^(a) Incremental costs are calculated for buildings constructed or renovated in 2014-2044; total benefits extend through 2074.

^(b) See footnote (b) for Table 2.

^(c) These values represent global values (in 2012\$) of the social cost of CO₂ (SCC) emissions in 2012 under several scenarios developed by the Interagency Working Group on Social Cost of Carbon (SCC) (OMB 2013). The values of \$12.9, \$40.8, and \$62.2 per metric ton are the averages of SCC distributions calculated using 5%, 3%, and 2.5% discount rates, respectively. The value of \$117.0 per ton represents the 95th percentile of the SCC distribution calculated using a 3% discount rate. For NO_x, values were extracted from OMB guidance (OMB 2006) and updated to 2012\$. An average value (\$2,639) of the low (\$468) and high (\$4,809) values was used.

^(d) Total monetary benefits for both the 3-percent and 7-percent cases utilize the central estimate of social cost of NO_x and CO₂ emissions calculated at a 3-percent discount rate (averaged across three integrated assessment models (IAMs)), which is equal to \$40.8/metric ton (in 2012\$).

The net benefits in 2010 dollars to the Federal government using the primary estimate for PV system costs turns out to be \$104.6 million/year using the 7% discount rate, while it is \$215.7 million/year using the 3% discount rate for the fossil fuel reduction rule (Table V-2), while the corresponding figures are negative \$99.0 million/year using the 7% discount rate and positive \$320 million/year using the 3% discount rate for the “zero fossil fuel” alternative to the rule (Table V-3).

B. Review under the Regulatory Flexibility Act

The Regulatory Flexibility Act (5 U.S.C. 601 *et seq.*) requires the preparation of an initial regulatory flexibility analysis for any rule that by law must be proposed for public comment, unless the agency certifies that the rule, if promulgated, will not have a significant economic impact on a substantial number of small entities. As required by Executive Order 13272, *Proper Consideration of Small Entities in Agency Rulemaking*, 67 FR 53461 (August 16, 2002), DOE published procedures and policies on February 19, 2003, to ensure that the potential impacts of its rules on small entities are properly considered during the rulemaking process (68 FR 7990). The Department has made its procedures and policies available on the Office of General Counsel’s website: <http://energy.gov/gc/guidance-opinions-0>.

This proposed rulemaking applies only to the fossil fuel-generated energy consumption of new Federal buildings and Federal buildings undergoing major renovation. As such, the only entities directly regulated by this rulemaking would be Federal agencies. DOE does not believe

that there will be any impacts on small entities such as small businesses, small organizations, or small governmental jurisdictions.

On the basis of the foregoing, DOE certifies that this proposed rule would not have a significant economic impact on a substantial number of small entities. Accordingly, DOE has not prepared a regulatory flexibility analysis for this rulemaking. DOE's certification and supporting statement of factual basis will be provided to the Chief Counsel for Advocacy of the Small Business Administration pursuant to 5 U.S.C. 605(b).

C. Review under the Paperwork Reduction Act of 1995

This rulemaking will impose no new information or record keeping requirements. Accordingly, Office of Management and Budget (OMB) clearance is not required under the Paperwork Reduction Act. (44 U.S.C. 3501 *et seq.*)

D. Review under the National Environmental Policy Act of 1969

DOE prepared an draft Environmental Assessment (EA) (DOE/EA-1778) entitled, "Environmental Assessment for Proposed Rulemaking, 10 CFR parts 433 and 435, 'Fossil Fuel-Generated Energy Consumption Reduction for New Federal Buildings and Major Renovations of Federal Buildings,'" pursuant to the Council on Environmental Quality's (CEQ) Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act (40 CFR parts 1500-1508), the National Environmental Policy Act of 1969 (NEPA), as amended (42 U.S.C.

4321 et seq.), and DOE's NEPA Implementing Procedures (10 CFR part 1021).

The draft EA addresses the possible environmental effects attributable to the implementation of the today's rule. The rule by its fundamental intent has a positive impact on the environment. The only anticipated impact of today's rulemaking would be a decrease in outdoor air pollutants resulting from reduced fossil fuel-generated energy consumption in new Federal buildings and major renovations of Federal buildings.

E. Review under Executive Order 13132, "Federalism"

Executive Order 13132, "Federalism," 64 FR 43255 (August 4, 1999), imposes certain requirements on agencies formulating and implementing policies or regulations that preempt State law or that have Federalism implications. The Executive Order requires agencies to examine the constitutional and statutory authority supporting any action that would limit the policymaking discretion of the States and to carefully assess the necessity for such actions. The Executive Order also requires agencies to have an accountable process to ensure meaningful and timely input by State and local officials in the development of regulatory policies that have Federalism implications. On March 14, 2000, DOE published a statement of policy describing the intergovernmental consultation process it will follow in the development of such regulations. (65 FR 13735). DOE examined this rulemaking and determined that it would not preempt State law and would not have a substantial direct effect on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of Government. No further action is required by Executive Order 13132.

F. Review under Executive Order 12988, “Civil Justice Reform”

With respect to the review of existing regulations and the promulgation of new regulations, section 3(a) of Executive Order 12988, “Civil Justice Reform,” 61 FR 4729 (February 7, 1996), imposes on Federal agencies the general duty to adhere to the following requirements: (1) eliminate drafting errors and ambiguity; (2) write regulations to minimize litigation; and (3) provide a clear legal standard for affected conduct, rather than a general standard and promote simplification and burden reduction. Section 3(b) of Executive Order 12988 specifically requires that Executive agencies make every reasonable effort to ensure that the regulation: (1) clearly specifies the preemptive effect, if any; (2) clearly specifies any effect on existing Federal law or regulation; (3) provides a clear legal standard for affected conduct, while promoting simplification and burden reduction; (4) specifies the retroactive effect, if any; (5) adequately defines key terms; and (6) addresses other important issues affecting clarity and general draftsmanship under any guidelines issued by the Attorney General. Section 3(c) of Executive Order 12988 requires Executive agencies to review regulations in light of applicable standards in section 3(a) and section 3(b) to determine whether they are met or it is unreasonable to meet one or more of them. DOE has completed the required review and determined that, to the extent permitted by law, this rulemaking meets the relevant standards of Executive Order 12988.

G. Review under the Unfunded Mandates Reform Act of 1995

Title II of the Unfunded Mandates Reform Act of 1995 (UMRA) (Pub. L. 104-4) requires

each Federal agency to assess the effects of Federal regulatory actions on State, local, and tribal governments and the private sector. For a proposed regulatory action likely to result in a rule that may cause the expenditure by State, local, and tribal governments, in the aggregate, or by the private sector of \$100 million or more in any one year (adjusted annually for inflation), section 202 of UMRA requires a Federal agency to publish a written statement that estimates the resulting costs, benefits, and other effects on the national economy. (2 U.S.C. 1532(a) and (b)) The UMRA also requires a Federal agency to develop an effective process to permit timely input by elected officers of State, local, and tribal governments on a proposed “significant intergovernmental mandate,” and requires an agency plan for giving notice and opportunity for timely input to potentially affected small governments before establishing any requirements that might significantly or uniquely affect small governments. On March 18, 1997, DOE published a statement of policy on its process for intergovernmental consultation under UMRA (62 FR 12820) (also available at <http://energy.gov/gc/guidance-opinions-0>). This rulemaking contains neither an intergovernmental mandate nor a mandate that may result in the expenditure of \$100 million or more in any year by State, local, and tribal governments, in the aggregate, or by the private sector so these requirements under the Unfunded Mandates Reform Act do not apply.

H. Review under the Treasury and General Government Appropriations Act of 1999

Section 654 of the Treasury and General Government Appropriations Act of 1999 (Pub. L. 105-277) requires Federal agencies to issue a Family Policymaking Assessment for any rule that may affect family well-being. This supplemental proposed rule would not have any impact on the autonomy or integrity of the family as an institution. Accordingly, DOE has preliminarily

concluded that it is not necessary to prepare a Family Policymaking Assessment.

I. Review under Executive Order 12630, "Governmental Actions and Interference with Constitutionally Protected Property Rights"

The Department has determined, under Executive Order 12630, "Governmental Actions and Interference with Constitutionally Protected Property Rights," 53 FR 8859 (March 18, 1988), that this rule would not result in any takings which might require compensation under the Fifth Amendment to the United States Constitution.

J. Review under the Treasury and General Government Appropriations Act, 2001

Section 515 of the Treasury and General Government Appropriations Act, 2001 (44 U.S.C. 3516, note) provides for agencies to review most disseminations of information to the public under guidelines established by each agency pursuant to general guidelines issued by OMB. OMB's guidelines were published at 67 FR 8452 (February 22, 2002), and DOE's guidelines were published at 67 FR 62446 (October 7, 2002). DOE has reviewed this rulemaking under the OMB and DOE guidelines and has preliminarily concluded that it is consistent with applicable policies in those guidelines.

K. Review under Executive Order 13211, "Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use"

Executive Order 13211, “Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use,” 66 FR 28355 (May 22, 2001), requires Federal agencies to prepare and submit to the Office of Information and Regulatory Affairs (OIRA), Office of Management and Budget, a Statement of Energy Effects for any proposed significant energy action. A “significant energy action” is defined as any action by an agency that promulgated or is expected to lead to promulgation of a final rule, and that: (1) is a significant regulatory action under Executive Order 12866, or any successor order; and (2) is likely to have a significant adverse effect on the supply, distribution, or use of energy, or (3) is designated by the Administrator of OIRA as a significant energy action. For any proposed significant energy action, the agency must give a detailed statement of any adverse effects on energy supply, distribution, or use should the proposal be implemented, and of reasonable alternatives to the action and their expected benefits on energy supply, distribution, and use. This rulemaking would not have a significant adverse effect on the supply, distribution, or use of energy. Moreover, as the rulemaking would result in increased building energy efficiency, it would not have a significant adverse effect on energy. For these reasons, the rulemaking is not a significant energy action. Accordingly, DOE has not prepared a Statement of Energy Effects.

L. Review Under the Information Quality Bulletin for Peer Review

In consultation with the Office of Science and Technology Policy (OSTP), OMB issued on December 16, 2004, its “Final Information Quality Bulletin for Peer Review” (the Bulletin). 70 FR 2664 (January 14, 2005). The Bulletin establishes that certain scientific information shall be peer reviewed by qualified specialists before it is disseminated by the Federal government,

including influential scientific information related to agency regulatory actions. The purpose of the Bulletin is to enhance the quality and credibility of the government's scientific information. Under the Bulletin, EIA's CBECS and RECS are "influential scientific information," which the Bulletin defines as "scientific information that the agency reasonably can determine will have or does have a clear and substantial impact on important public policies or private sector decisions." 70 FR 2664, 2667 (January 14, 2005). The Academy recommendations have been peer reviewed pursuant to section II.2 of the Bulletin. Both surveys are peer reviewed internally within EIA and other DOE offices before they are published. In addition, both surveys are subject to public comment that EIA addresses before finalizing CBECS and RECS.

List of Subjects in 10 CFR Parts 433 and 435

Buildings and facilities, Energy conservation, Engineers, Federal buildings and facilities, Fossil fuel reductions, Housing, Incorporation by reference, Multi-family residential buildings.

Issued in Washington, DC, on September 28, 2014.

David Danielson,
Assistant Secretary,
Energy Efficiency and Renewable Energy.

For the reasons set forth in the preamble, DOE proposes to amend chapter II of title 10 of the Code of Federal Regulations as set forth below:

**PART 433 – ENERGY EFFICIENCY STANDARDS FOR THE DESIGN AND
CONSTRUCTION OF NEW FEDERAL COMMERCIAL AND MULTI-FAMILY HIGH-
RISE RESIDENTIAL BUILDINGS**

1. The authority citation for part 433 continues to read as follows:

Authority: 42 U.S.C. 6831–6832, 6834–6835; 42 U.S.C. 7101 *et seq.*

2. In § 433.1, paragraph (b) is added to read as follows:

§ 433.1 Purpose and scope.

* * * * *

(b) This part also establishes a maximum allowable fossil fuel-generated energy consumption standard for new Federal buildings that are commercial and multi-family high-rise residential buildings and major renovations to Federal buildings that are commercial and multi-family high-rise residential buildings, for which design for construction began on or after **[DATE ONE YEAR AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]**.

* * * * *

3. In § 433.2:

- a. Add in alphabetical order, the definitions of “Combined heat and power (CHP) system,” “Construction cost,” “District energy system,” “Fiscal year (FY),” “Major renovation,” “Multi-family high-rise residential building,” “Power purchase agreement (PPA),” and “Renewable energy certificate”;
- b. Revise the definitions of “New Federal building” and “Proposed building”; and
- c. Remove the definitions of “Life-cycle cost” and “Life-cycle cost-effective”.

The additions and revisions read as follows:

§ 433.2 Definitions.

* * * * *

Combined heat and power (CHP) system means an integrated system, located at or near a building or facility that is used to generate both heat and electricity for use in the building or

facility.

* * * * *

Construction cost means all costs associated with design and construction of a building. It includes the cost of design, permitting, construction (materials and labor), and building commissioning. It does not include legal or administrative fees, or the cost of acquiring the land.

* * * * *

District energy system means a central energy conversion plant and transmission and distribution system that provides thermal energy to a group of buildings (heating via hot water or steam, and/or cooling via chilled water). This definition only includes thermal energy systems; central energy supply systems that only provide electricity are excluded from this definition.

* * * * *

Fiscal year (FY) begins on October 1 of the year prior to the specified calendar year and ends on September 30 of the specified calendar year.

* * * * *

Major renovation means changes to a building that provide significant opportunities for compliance with other applicable requirements in this part. For subpart B --reduction in fossil

fuel-related energy consumption, for example, replacement of the HVAC system, lighting system, building envelope, or other components of the building that have a major impact on energy usage would constitute a major renovation.

Multi-family high-rise residential building means a residential building that contains 3 or more dwelling units and that is designed to be 4 or more stories above grade.

New Federal building means any new building (including a complete replacement of an existing building from the foundation up) to be constructed by, or for the use of, any Federal agency. Such term shall include buildings built for the purpose of being leased by a Federal agency, and privatized military housing.

Power purchase agreement means an agreement with an electricity producer for all or a specified portion of the electricity produced from a particular power source, in this case a renewable energy source, for a specified period of time.

* * * * *

Proposed Building means the design for construction of a new Federal commercial or multi-family high-rise residential building, or major renovation to a Federal commercial multi-family high-rise residential building, proposed for construction.

* * * * *

Renewable energy certificate means the technology and environmental (non-energy) attributes

that represent proof that 1 megawatt-hour (MWh) of electricity was generated from a renewable energy resource, and can be sold separately from the underlying generic electricity with which it is associated.

4. Revise § 433.3(b)(3) to read as follows:

§ 433.3 Materials incorporated by reference.

* * * * *

(b) * * *

(3) ANSI/ASHRAE/IESNA 90.1-2010, (“ASHRAE 90.1-2010”), Energy Standard for Buildings Except Low-Rise Residential Buildings, I-P Edition, Copyright 2010, IBR approved for §§433.2, 433.100, 433.101, Appendix A to subpart B.

5. Revise § 433.4 to read as follows:

§ 433.4 Life-cycle cost-effective.

Except as specified in subparts A, B or C of this part, Federal agencies shall determine life-cycle cost-effectiveness by using the procedures set out in subpart A of part 436 of this chapter. A Federal agency may choose to use any of four methods, including life-cycle cost, net savings, savings-to-investment ratio, and adjusted internal rate of return using the discount rate published in the annual supplement to the Life Cycle Costing Manual for the Federal Energy Management Program (NIST 85–3273).

6. Subpart B is added to part 433 to read as follows:

Subpart B - - Reduction in Fossil Fuel-Generated Energy Consumption

Sec.

433.200 Fossil fuel-generated energy consumption requirement.

433.201 Fossil fuel-generated energy consumption determination.

433.202 Petition for downward adjustment.

Appendix A to Subpart B of Part 433 – Maximum Allowable Fossil Fuel-Generated Energy Consumption

Subpart B – Reduction in Fossil Fuel-Generated Energy Consumption

§ 433.200 Fossil fuel-generated energy consumption requirement.

- (a) New Federal buildings. New Federal buildings that are commercial and multi-family high rise residential buildings, for which design for construction began on or after **[DATE ONE YEAR AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]**, must be designed to meet the requirements of paragraphs (c) or (d) of this section, as applicable, if:
- (1) The subject building is a public building as defined in 40 U.S.C. 3301 and for which transmittal of a prospectus to Congress is required under 40 U.S.C. 3307; or
 - (2) The cost of the building is at least \$2,500,000 (in 2007 dollars, adjusted for inflation).
- (b) Major renovations. (1) Major renovations to Federal buildings that are commercial and multi-family high-rise residential buildings, for which design for construction began on or

after **[DATE ONE YEAR AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]**, must be designed to meet the requirements of paragraph (c) or (d) of this section, as applicable, if:

- (i) The renovation is a major renovation to a public building as defined in 40 U.S.C. 3301 and for which transmittal of a prospectus to Congress is required under 40 U.S.C. 3307; or
 - (ii) The cost of the major renovation is at least \$2,500,000 (in 2007 dollars, adjusted for inflation).
- (2) This subpart applies only to the portions of the proposed building or proposed building systems that are being renovated and to the extent that the scope of the renovation permits compliance with the applicable requirements in this subpart. Unaltered portions of the proposed building or proposed building systems are not required to comply with this subpart.
- (3) For leased buildings, this subpart applies to major renovations only if the building was originally built for the use of any Federal agency, including being leased by a Federal agency.
- (c) Federal buildings that are of the type included in Appendix A of this subpart — (1) Design for construction began during fiscal year 2014 through fiscal year 2029. The

fossil fuel-generated energy consumption of the proposed building, based on the building design and calculated according to §433.201(a), must not exceed the value identified in Tables 1-4 of Appendix A of this subpart for the associated building type, climate zone, and fiscal year in which design for construction began.

(2) Design for construction began during or after fiscal year 2030. The fossil fuel-generated energy consumption of the proposed building, based on building design and calculated according to §433.201(a), must be zero.

(3) Mixed-use buildings. (i) For buildings that combine two or more building types identified in Tables 1-4 of Appendix A of this subpart, the maximum allowable fossil fuel-generated energy consumption of the proposed building is equal to the averaged applicable building type values in Tables 1-4 weighted by floor area of the present building types.

(ii) For example, if a proposed building for which design for construction began in FY2014 that is to be built in climate zone 1 has a total of 200 square feet -- 100 square feet of which qualifies as College/University and 100 square feet of which qualifies as Laboratory -- the maximum allowable fossil fuel-generated energy consumption is equal to:

$$[(100 \text{ sqft.} \times 89 \text{ kBtu/yr.-sqft.}) + (100 \text{ sqft} \times 251 \text{ kBtu/yr.-sqft.})] / 200\text{sqft.} = 170 \text{ kBtu/yr.-sqft.}$$

(d) Federal buildings that are of the type not included in Appendix A of this subpart —

(1) Process load buildings. For building types that are not included in any of the building types listed in Tables 1-4 of Appendix A of this subpart, Federal agencies must select the applicable building type, climate zone, and fiscal year in which design for construction began from Tables 1-4 of Appendix A of this subpart that most closely corresponds to the proposed building without the process load. The estimated fossil fuel-generated energy consumption of the process load must be added to the maximum allowable fossil fuel-generated energy consumption of the applicable building type for the appropriate fiscal year and climate zone to calculate the maximum allowable fossil fuel-generated energy consumption for the building. The same estimated fossil fuel-generated energy consumption of the process load that is added to the maximum allowable fossil fuel-generated energy consumption of the applicable building must also be used in determining the fossil fuel-generated energy consumption of the proposed building.

(2) Mixed-use buildings. For buildings that combine two or more building types with process loads or, alternatively, that combine one or more building types with process loads with one or more building types in Tables 1-4 of Appendix A of this subpart, the maximum allowable fossil fuel-generated energy consumption of the proposed building is equal to the averaged process load building values determined under paragraph (d)(1) of this section and the applicable building type values in Tables 1-4 of Appendix A of this subpart, weighted by floor area.

§ 433.201 Fossil fuel-generated energy consumption determination.

(a) The fossil fuel-generated energy consumption of a proposed building is calculated as follows:

Equation 1: Fossil fuel-generated energy consumption = $((3.412 \text{ kBtu/kwh} \times \text{Fossil Fuel Generation Factor} \times (\text{Proposed Building Site Electricity Consumption} - \text{Renewable Energy and CHP Electricity Deduction}) / \text{Electricity Source Energy Factor}) + (\text{Direct Fossil Fuel Consumption of Proposed Building} \times \text{Other Fuels Source Energy Multiplier})) / \text{Floor Area}$

Whereas:

(1) Fossil Fuel-Generation Factor is equal to $(\text{AEP}_{\text{coal}} + \text{AEP}_{\text{pl}} + \text{AEP}_{\text{pc}} + \text{AEP}_{\text{ng}} + \text{AEP}_{\text{og}}) / \text{Total AEP}$

Where

AEP = annual electrical production

pl= petroleum liquids

pc=petroleum coke

ng= natural gas

og = other gas

All values are taken from Table 3.2.A of the EIA Electric Power Annual Report, which is updated on a periodic basis. DOE will on an annual basis calculate the Fossil Fuel Generation Factor and publish the result at the following web address: <http://energy.gov/eere/femp/federal-energy-management-program>

(2) Proposed Building Site Electricity Consumption equals the estimated site electricity consumption of the proposed building calculated in accordance with the Performance Rating Method in Appendix G of ASHRAE 90.1-2010 (incorporated by reference; see §433.3) measured in kilowatt hours per year (kWh/yr).

(3) Renewable Energy and CHP Electricity Deduction equals the total contribution specified in paragraph (b) of this section, measured in kilowatt hours per year (kWh/yr).

(4) Electricity Source Energy Factor For electricity purchased from the grid, the Electricity Source Energy Factor is equal to 0.316. For on-site electrical generation, the Electricity Source Factor is the estimated efficiency of the generating equipment and any estimated distribution losses that may occur.

(5) Direct Fossil Fuel Consumption of Proposed Building equals the total site fossil fuel consumption of the proposed building calculated in accordance with the Performance Rating Method in Appendix G of ASHRAE 90.1-2010 (incorporated by reference; see §433.3), excluding fossil fuel consumption for electricity generation, and measured in thousands of British thermal units per year (kBtu/yr). This includes any fossil fuel consumption attributable to non-electric power (e.g., heat or steam) used in a proposed building that is supplied by a district energy system or CHP system.

(6) Other Fuels Source Energy Multiplier For purposes of Equation 1, the multipliers are as follows:

Natural gas	1.046
Fuel oil	1.00
Propane	1.00
District steam (non-CHP)	1.35
District steam (CHP)	2.30
District hot water	1.28
Chilled water	1.05
Coal	1.00

(7) Floor Area is the area enclosed by the exterior walls of a building, both finished and unfinished, including indoor parking facilities, basements, hallways, lobbies, stairways, and elevator shafts.

(b) Renewable and CHP electricity deductions — (1) Renewable electricity. The following renewable electricity generation qualifies as a deduction under paragraph (a) of this section to the extent that the renewable electricity generation represents new electric generating capacity or a new renewable energy obligation on the part of the agency, and not a reassignment of existing capacity or obligations:

- (i) *On-site renewable electricity generation* is the amount of electricity measured in kilowatt hours per year (kWh/yr) to be consumed by the building that is contributed by renewable electricity generated at the Federal site or facility on which the building will be located. On-site renewable electricity can only be deducted if the environmental attributes are not transferred.
- (ii) *Off-site renewable electricity generation* is the amount of renewable electricity measured in kilowatt hours per year (kWh/yr) generated at a site or facility, either Federal or non-federal, other than the Federal site or facility on which the building will be located and that is designated for the purpose of complying with this section, and may include renewable electricity generation purchased under Power Purchase Agreements and Renewable Energy Certificates.

(2) Limitation on the use of renewable electricity generation for new Federal buildings and major renovations. The environmental attributes of the renewable electricity generation must not be transferred. The agency must ensure that the environmental attributes of renewable electricity generation are dedicated to meeting the fossil fuel-generated energy consumption reduction requirements of the proposed building.

(3) CHP deduction. Electricity associated with non-electric power provided to a proposed building by a district energy system that is a CHP system or an on-site CHP system qualifies as a deduction under paragraph (a) of this section and is equal to the total heat delivered to the proposed building from the direct energy system divided by total heat produced by the CHP system, times the total electricity produced by the CHP system.

§433.202 Petition for downward adjustment.

(a) New Federal buildings. (1) Upon petition by a Federal agency, excluding the General Services Administration (GSA) but including GSA-tenant agencies with significant control over building design, the Director of the Federal Energy Management Program may adjust the applicable maximum allowable fossil fuel-generated energy consumption standard with respect to a specific building, upon written certification from the head of the agency designing the building, or the head of a GSA-tenant agency, that the requested adjustment is the largest feasible reduction in fossil fuel-generated consumption that can practicably be achieved in light of the specified functional needs for that building, as demonstrated by:

- (i) A statement sealed by the design engineer that the proposed building was designed in accordance with the applicable energy efficiency requirement in Subpart A of this Part;
- (ii) A description of the technologies and practices that were evaluated and rejected, including a justification of why they were not included in the design for construction; and
- (iii) Any other information the agency determines would help explain its request;

(2) The head of the agency designing the building, or the head of a GSA-tenant agency, must also include the following information in the petition:

- (i) A general description of the building, including but not limited to location, use type, floor area, stories, and functional needs;
- (ii) The maximum allowable fossil fuel-generated energy consumption for the building from Tables 1-4 of Appendix A of this subpart;
- (iii) The estimated fossil fuel-generated energy consumption of the proposed building;
- (iv) A description of the proposed building's energy-related features, including but not limited to:

(A) Building envelope, including, but not limited to, construction materials, insulation levels, and the type, area, heat loss and solar heat gain and visible light transmission coefficients of windows and other glazing;

(B) HVAC system type and configuration;

(C) HVAC equipment sizes and efficiencies;

(D) Ventilation systems (including outdoor air volume, controls technique, heat recovery systems, and economizers, if applicable);

(E) Service water heating system configuration and equipment (including solar hot water, wastewater heat recovery, and controls for circulating hot water systems, if applicable);

(F) Lighting technology, interior lighting power, and lighting control techniques;

(G) Estimated process and plug loads; and

(H) Any other energy-related equipment; and

(3) The Director of the Federal Energy Management Program may concur in whole or in part with a petition. Upon concurring in part, the Director of the Federal Energy Management

Program will establish an applicable maximum allowable fossil fuel-generated energy consumption standard with respect to a specific building other than the value put forth in the petition.

(4) Petitions for downward adjustment should be submitted to ff-petition@ee.doe.gov , or to:

U.S. Department of Energy
Federal Energy Management Program
Director
Fossil Fuel Reductions in New Federal Buildings
EE-2L
1000 Independence Ave., SW.,
Washington, D.C. 20585-0121

(5) The Director will notify the requesting agency in writing whether the petition for downward adjustment to the numeric reduction requirement is approved, in whole or in part, or rejected, within 90 days of submittal. If the Director rejects -the petition or establishes a value other than that presented in the petition, the Director will forward its reasons for rejection to the petitioning agency.

(b) Major renovations to Federal buildings. (1) Major renovation of the whole building. Upon petition by a Federal agency, excluding the General Services Administration (GSA) but including GSA-tenant agencies with significant control over renovation design, the Director of the Federal Energy Management Program will adjust the applicable maximum allowable fossil fuel-generated energy consumption standard with respect to a specific major renovation of a whole building, upon written certification from the head of the agency designing the building, or the head of a GSA-tenant agency, that the requested adjustment is the largest feasible reduction in fossil fuel-generated consumption that can practicably be achieved in light of the specified

functional needs for that building, as demonstrated by a statement stamped by the design engineer that the proposed building was designed consistent with the energy efficiency requirement in subpart A of this part that corresponds to the date of the proposed building.

(2) Major renovation of a building system or component. Upon petition by a Federal agency, excluding the General Services Administration (GSA) but including GSA-tenant agencies with significant control over renovation design, the Director of the Federal Energy Management Program will adjust the applicable maximum allowable fossil fuel-generated energy consumption standard with respect to a specific major renovation limited to a building system or component, upon written certification from the head of the agency designing the building, or the head of a GSA-tenant agency, that the requested adjustment is the largest feasible reduction in fossil fuel-generated consumption that can practicably be achieved in light of the specified functional needs for that building, as demonstrated by a statement stamped by the design engineer that the proposed building incorporates commercially available systems and/ or components that provide a level of energy efficiency that is life-cycle cost effective.

(3) Petitions for downward adjustment should be submitted to ff-petition@ee.doe.gov, or to:

U.S. Department of Energy
Federal Energy Management Program
Director
Fossil Fuel Reductions in New Federal Buildings
EE-2L
1000 Independence Ave., SW.,
Washington, D.C. 20585-0121

(4) The downward adjustment for a major renovation will be deemed approved upon submittal of

the certification required in paragraphs (b)(1) or (b)(2) of this section, as applicable.

Appendix A to Subpart B of Part 433 – Maximum Allowable Fossil Fuel-Generated Energy Consumption

(a) For purposes of the tables in this Appendix, the climate zones for each county in the United States are those listed in Normative Appendix B Building Envelope Climate Criteria, Table B-1 U.S. Climate Zones, ASHRAE 90.1-2010 (incorporated by reference; see §433.3).

(b) For purpose of Appendix A, the following definitions apply:

Education means a category of buildings used for academic or technical classroom instruction, such as elementary, middle, or high schools, and classroom buildings on college or university campuses. Buildings on education campuses for which the main use is not as a classroom are included in the category relating to their use. For example, administration buildings are part of "Office," dormitories are "Lodging," and libraries are "Public Assembly."

Food Sales means a category of buildings used for retail or wholesale of food. For example, grocery stores are "Food Sales."

Food Service means a category of buildings used for preparation and sale of food and beverages for consumption. For example, restaurants are "Food Service."

Health Care (Inpatient) means a category of buildings used as diagnostic and treatment facilities for inpatient care.

Health Care (Outpatient) means a category of buildings used as diagnostic and treatment facilities for outpatient care. Medical offices are included here if they use any type of diagnostic medical equipment (if they do not, they are categorized as an office building).

Laboratory means a category of buildings equipped for scientific experimentation or research as well as other technical, analytical and administrative activities.

Lodging means a category of buildings used to offer multiple accommodations for short-term or long-term residents, including skilled nursing and other residential care buildings.

Mercantile (Enclosed and Strip Malls) means a category of shopping malls comprised of multiple connected establishments.

Multi-Family High-Rise Residential Buildings means a category of residential buildings that contain 3 or more dwelling units and that is designed to be 4 or more stories above grade.

Office means a category of buildings used for general office space, professional office, or administrative offices. Medical offices are

included here if they do not use any type of diagnostic medical equipment (if they do, they are categorized as an outpatient health care building).

Public Assembly means a category of public or private buildings, or spaces therein, in which people gather for social or recreational activities.

Public Order and Safety means a category of buildings used for the preservation of law and order or public safety.

Religious Worship means a category of buildings in which people gather for religious activities, (such as chapels, churches, mosques, synagogues, and temples).

Retail (Other Than Mall) means a category of buildings used for the sale and display of goods other than food.

Service means a category of buildings in which some type of service is provided, other than food service or retail sales of goods.

Warehouse and Storage means a category of buildings used to store goods, manufactured products, merchandise, raw materials, or personal belongings (such as self-storage).

Table 1 - FY2013-FY2014 Maximum Allowable Fossil Fuel-Generated Energy Consumption by Building Category, Building Type and Climate Zone, Commercial Buildings and Multi-Family High-Rise Residential Buildings (source kBtu/yr-sqft)																	
Building Category	Climate Zone:	1	2A	2B	3A	3B Coast	3B Other	3C	4A	4B	4C	5A	5B	6A	6B	7	8
	Building Type	Fossil Fuel-Generated Energy Use Intensity (source kBtu/yr-sqft)															
Education	College/university	89	88	87	81	59	84	71	73	65	70	77	65	92	82	97	146
Education	Elementary/middle school	54	54	52	49	40	50	45	41	39	39	42	37	47	43	48	71
Education	High school	65	65	63	59	43	61	52	53	48	51	56	48	67	60	71	106
Education	Other classroom education	36	36	35	33	24	34	29	30	27	29	31	27	37	33	40	59
Education	Preschool/daycare	70	69	67	63	52	65	58	53	50	51	54	47	60	56	62	92
Food Sales	Convenience store	194	215	208	197	178	213	189	164	173	181	166	153	181	200	199	259
Food Sales	Convenience store with gas	156	173	167	158	144	171	152	132	139	146	133	124	145	161	160	209
Food Sales	Grocery store/food market	162	179	173	164	149	177	158	137	144	151	138	128	150	167	166	216
Food Sales	Other food sales	49	54	52	50	45	54	48	41	44	46	42	39	46	50	50	65
Food Service	Fast food	378	395	402	358	333	407	338	303	323	327	308	286	339	373	375	490
Food Service	Other food service	112	117	118	106	97	120	100	90	96	98	91	84	100	110	111	144
Food Service	Restaurant/cafeteria	204	214	216	195	177	219	183	164	175	180	166	154	182	202	203	264
Inpatient Health Care	Hospital/inpatient health	205	210	215	182	188	212	174	142	149	156	129	120	133	146	137	163
Laboratory	Laboratory	251	254	247	233	197	245	217	196	190	192	203	184	229	216	238	320
Lodging	Dormitory/fraternity/sorority	58	61	61	62	42	63	56	58	53	59	65	55	76	70	84	118

Lodging	Hotel	71	73	70	67	62	70	68	55	57	57	57	55	62	62	64	74
Lodging	Motel or inn	80	76	76	66	63	73	65	52	54	52	52	50	57	55	56	68
Lodging	Nursing home/ assisted living	118	12	117	110	93	115	103	93	90	91	96	87	108	102	112	151
Lodging	Other lodging	76	73	72	63	60	69	62	50	52	50	50	48	54	53	54	65
Mercantile	Enclosed mall	81	81	79	77	58	78	68	69	64	66	77	67	91	84	99	143
Mercantile	Strip shopping Mall	85	85	83	81	61	82	72	72	67	69	81	70	96	89	104	150
Office	Administrative/ profess. office	56	58	57	54	43	56	47	46	43	44	48	42	54	50	57	80
Office	Bank/other financial	80	82	80	77	62	79	67	65	61	62	67	59	77	71	81	114
Office	Government office	70	72	71	67	54	70	59	57	54	55	59	52	68	62	71	100
Office	Medical office (non-diagnostic)	48	49	48	46	37	48	40	39	37	37	40	36	46	42	48	68
Office	Mixed-use office	65	67	65	63	50	65	54	53	50	51	55	48	63	58	66	93
Office	Other office	54	56	55	52	42	54	45	44	42	42	46	40	52	48	55	78
Outpatient Health Care	Clinic/other outpatient health	72	70	70	63	60	70	56	48	50	46	45	44	47	48	45	52
Outpatient Health Care	Medical office (diagnostic)	48	46	47	42	40	46	38	32	33	31	30	30	32	32	30	35
Public Assembly	Entertainment/ culture	33	33	32	30	26	32	28	26	25	25	26	24	30	28	31	42
Public Assembly	Library	86	87	85	80	68	84	75	68	65	66	70	63	79	74	82	110
Public Assembly	Other public assembly	40	40	39	37	31	39	34	31	30	30	32	29	36	34	38	51
Public Assembly	Recreation	37	38	37	35	29	36	32	29	28	29	30	27	34	32	35	47
Public Assembly	Social/meeting	39	39	38	36	31	38	34	30	29	30	31	28	35	33	37	49
Public	Fire station/	92	93	91	86	73	90	80	72	70	71	75	68	84	80	88	118

Order & Safety	police station																
Public Order & Safety	Other public order and safety	84	85	83	78	66	82	73	66	64	65	68	62	77	73	80	107
Religious Worship	Religious worship	33	33	32	31	26	32	29	26	25	25	27	24	30	28	31	42
Retail (except malls)	Other retail	70	72	70	68	50	69	59	60	56	56	66	58	79	73	85	123
Retail (except malls)	Retail store	40	41	40	39	28	39	34	34	32	32	38	33	45	42	49	71
Retail (except malls)	Vehicle dealership showroom	71	72	70	68	50	69	59	60	56	57	67	58	79	73	85	123
Service	Other service	85	86	84	79	65	83	71	67	63	64	69	66	76	70	81	104
Service	Post office/postal center	60	61	59	56	47	59	52	47	45	46	49	44	55	52	57	77
Service	Repair shop	40	40	39	37	31	39	34	32	30	30	33	31	36	33	38	49
Service	Vehicle service/repair shop	46	47	46	43	36	45	39	37	34	35	38	36	42	38	44	57
Service	Vehicle storage/maintenance	20	20	20	19	15	20	17	16	15	15	16	16	18	17	19	25
Warehouse	Distribution/shipping center	18	23	24	26	14	26	20	27	24	23	35	32	49	41	59	108
Warehouse	Non-refrigerated warehouse	9	11	11	13	7	12	9	13	12	11	17	15	24	20	29	52
Warehouse	Refrigerated warehouse	97	100	102	90	81	101	80	75	78	79	74	68	82	89	90	123
Residential	Multi-family high-rise residential	48	46	39	41	24	40	28	41	37	41	45	38	52	46	55	72

Table 2 - FY2015-FY2019 Maximum Allowable Fossil Fuel-Generated Energy Consumption by Building Category, Building Type and Climate Zone, Commercial Buildings and Multi-Family High-Rise Residential Buildings (source kBtu/yr-sqft)																	
Building Category	Climate Zone:	1	2A	2B	3A	3B Coast	3B Other	3C	4A	4B	4C	5A	5B	6A	6B	7	8
	Building Type	Fossil Fuel-Generated Energy Use Intensity (source kBtu/yr-sqft)															
Education	College/university	69	69	67	63	46	65	55	56	51	55	60	51	71	64	76	113
Education	Elementary/middle school	42	42	40	38	31	39	35	32	30	31	32	29	36	34	37	56
Education	High school	51	50	49	46	34	48	40	41	37	40	44	37	52	47	55	83
Education	Other classroom education	28	28	28	26	19	27	23	23	21	22	24	21	29	26	31	46
Education	Preschool/daycare	55	54	52	49	40	50	45	41	39	39	42	37	47	43	48	72
Food Sales	Convenience store	151	167	161	153	139	165	147	128	134	141	129	119	140	156	155	202
Food Sales	Convenience store with gas	122	135	130	123	112	133	119	103	108	113	104	96	113	125	125	163
Food Sales	Grocery store/food market	126	139	135	127	116	138	123	106	112	117	107	99	117	130	129	168
Food Sales	Other food sales	38	42	41	39	35	42	37	32	34	36	32	30	35	39	39	51
Food Service	Fast food	294	307	313	279	259	317	263	235	251	255	239	222	264	290	292	381
Food Service	Other food service	87	91	92	83	75	93	78	70	74	76	71	66	78	86	86	112
Food Service	Restaurant/cafeteria	159	166	168	151	138	170	143	128	136	140	129	120	142	157	158	206
Inpatient Health Care	Hospital/inpatient health	159	164	167	142	146	165	136	111	116	121	100	93	103	113	107	127

Laboratory	Laboratory	195	197	192	182	153	190	169	153	148	150	158	143	178	168	185	249
Lodging	Dormitory/ fraternity/ sorority	45	48	47	48	32	49	44	45	41	46	50	43	59	54	65	92
Lodging	Hotel	56	57	54	52	48	55	53	43	44	44	44	43	48	48	49	58
Lodging	Motel or inn	62	59	59	52	49	57	51	41	42	41	41	39	44	43	44	53
Lodging	Nursing home/ assisted living	92	93	91	86	72	90	80	72	70	71	75	67	84	79	87	117
Lodging	Other lodging	59	56	56	49	47	54	49	39	40	39	39	37	42	41	42	51
Mercantile	Enclosed mall	63	63	62	60	45	61	53	53	50	51	60	52	71	66	77	111
Mercantile	Strip shopping mall	66	66	65	63	47	64	56	56	52	54	63	54	74	69	81	117
Office	Administrative/ profess. office	44	45	44	42	34	43	36	36	33	34	37	32	42	39	44	63
Office	Bank/other financial	62	64	62	60	48	62	52	51	48	49	52	46	60	55	63	89
Office	Government office	55	56	55	52	42	54	46	45	42	43	46	40	53	48	55	78
Office	Medical office (non-diagnostic)	37	38	37	36	29	37	31	30	29	29	31	28	36	33	38	53
Office	Mixed-use office	51	52	51	49	39	50	42	41	39	40	43	38	49	45	51	72
Office	Other office	42	44	43	41	33	42	35	35	32	33	36	31	41	37	43	60
Outpatient Health Care	Clinic/other outpatient health	56	54	55	49	46	54	44	37	39	36	35	35	37	37	35	40
Outpatient Health Care	Medical office (diagnostic)	37	36	36	32	31	36	29	25	26	24	23	23	25	25	23	27
Public Assembly	Entertainment/ culture	25	26	25	24	20	25	22	20	19	20	21	19	23	22	24	32
Public Assembly	Library	67	68	66	62	53	65	58	53	51	51	54	49	61	58	64	86
Public	Other public	31	31	30	29	24	30	27	24	23	24	25	23	28	27	29	39

Assembly	assembly																
Public Assembly	Recreation	29	29	29	27	23	28	25	23	22	22	23	21	26	25	27	37
Public Assembly	Social/meeting	30	31	30	28	24	29	26	24	23	23	24	22	28	26	29	38
Public Order & Safety	Fire station/ police station	72	73	71	67	56	70	62	56	54	55	58	53	66	62	68	92
Public Order & Safety	Other public order and safety	65	66	65	61	51	64	57	51	50	50	53	48	60	56	62	83
Religious Worship	Religious worship	26	26	25	24	20	25	22	20	19	20	21	19	23	22	24	33
Retail (except malls)	Other retail	55	56	55	53	39	53	46	47	44	44	52	45	61	57	66	96
Retail (except malls)	Retail store	31	32	31	30	22	31	26	27	25	25	30	26	35	32	38	55
Retail (except malls)	Vehicle dealership showroom	55	56	55	53	39	54	46	47	44	44	52	45	62	57	66	96
Service	Other service	66	67	65	61	51	64	55	52	49	50	54	51	59	55	63	81
Service	Post office/postal center	47	47	46	43	37	46	40	37	35	36	38	34	43	40	44	60
Service	Repair shop	31	31	31	29	24	30	26	25	23	23	25	24	28	26	30	38
Service	Vehicle service/ repair shop	36	36	36	34	28	35	30	28	27	27	29	28	33	30	34	44
Service	Vehicle storage/ maintenance	16	16	15	15	12	15	13	12	12	12	13	12	14	13	15	19
Warehouse	Distribution/ shipping center	14	18	18	20	11	20	15	21	19	18	27	25	38	32	46	84
Warehouse	Non-refrigerated	7	8	9	10	5	10	7	10	9	9	13	12	18	15	22	41

	warehouse																
Warehouse	Refrigerated warehouse	76	78	79	70	63	78	62	58	61	61	58	53	64	69	70	96
Residential	Multi-family high-rise residential	37	36	30	32	18	31	22	32	29	32	35	30	40	36	42	56

Table 3 - FY2020-FY2024 Maximum Allowable Fossil Fuel-Generated Energy Consumption by Building Category, Building Type and Climate Zone, Commercial Buildings and Multi-Family High-Rise Residential Buildings (source kBtu/yr-sqft)																	
Building Category	Climate Zone:	1	2A	2B	3A	3B Coast	3B Other	3C	4A	4B	4C	5A	5B	6A	6B	7	8
	Building Type	Fossil Fuel-Generated Energy Use Intensity (source kBtu/yr-sqft)															
Education	College/ university	40	39	39	36	26	37	32	32	29	31	34	29	41	36	43	65
Education	Elementary/ middle school	24	24	23	22	18	22	20	18	17	17	19	16	21	19	21	32
Education	High school	29	29	28	26	19	27	23	24	21	23	25	21	30	27	32	47
Education	Other classroom education	16	16	16	15	11	15	13	13	12	13	14	12	17	15	18	26
Education	Preschool/ daycare	31	31	30	28	23	29	26	24	22	23	24	21	27	25	28	41
Food Sales	Convenience store	86	95	92	87	39	95	84	73	77	81	74	68	80	89	88	115
Food Sales	Convenience store with gas	70	77	74	70	64	76	68	59	62	65	59	55	65	72	71	93
Food Sales	Grocery store/ food market	72	80	77	73	66	79	70	61	64	67	61	57	67	74	74	96
Food Sales	Other food sales	22	24	23	22	20	24	21	18	19	20	19	17	20	22	22	29
Food Service	Fast food	168	175	179	159	148	181	150	135	144	146	137	127	151	166	167	218
Food Service	Other food service	50	52	52	47	43	53	45	40	42	44	40	37	44	49	49	54
Food Service	Restaurant/ cafeteria	91	95	96	86	79	97	81	73	78	80	74	69	81	90	90	117
Inpatient Health Care	Hospital/ inpatient health	91	94	95	81	83	94	77	63	66	69	57	53	59	65	61	73
Laboratory	Laboratory	112	113	110	104	88	109	97	87	84	86	90	82	102	96	106	142
Lodging	Dormitory/	26	27	27	27	19	28	25	26	23	26	29	24	34	31	37	52

	fraternity/ sorority																
Lodging	Hotel	32	33	31	30	27	31	30	25	25	25	25	24	28	28	28	33
Lodging	Motel or inn	36	34	34	29	28	32	29	23	24	23	23	22	25	25	25	30
Lodging	Nursing home/ assisted living	53	53	52	49	41	51	46	41	40	40	43	39	48	45	50	67
Lodging	Other lodging	34	32	32	28	27	31	28	22	23	22	22	21	24	23	24	29
Mercantile	Enclosed mall	36	36	35	34	26	35	30	31	29	29	34	30	41	37	44	63
Mercantile	Strip shopping mall	38	38	37	36	27	36	32	32	30	31	36	31	43	39	46	67
Office	Administrative/ profess. office	25	26	25	24	19	25	21	20	19	20	21	19	24	22	25	36
Office	Bank/other financial	35	37	36	34	27	35	30	29	27	28	30	26	34	31	36	51
Office	Government office	31	32	31	30	24	31	26	26	24	24	26	23	30	28	32	45
Office	Medical office (non-diagnostic)	21	22	21	20	16	21	18	17	16	17	18	16	21	19	21	30
Office	Mixed-use office	29	30	29	28	22	29	24	24	22	23	24	21	28	26	29	41
Office	Other office	24	25	24	23	19	24	20	20	18	19	20	18	23	21	24	35
Outpatient Health Care	Clinic/other outpatient health	32	31	31	28	26	31	25	21	22	20	20	20	21	21	20	23
Outpatient Health Care	Medical office (diagnostic)	21	21	21	19	18	21	17	14	15	14	13	13	14	14	13	15
Public Assembly	Entertainment/ culture	15	15	14	14	11	14	13	11	11	11	12	11	13	13	14	19
Public Assembly	Library	38	39	38	36	30	37	33	30	29	29	31	28	35	33	36	49
Public Assembly	Other public assembly	18	18	17	16	14	17	15	14	13	14	14	13	16	15	17	23
Public Assembly	Recreation	17	17	16	15	13	16	14	13	13	13	13	12	15	14	16	21
Public	Social/meeting	17	17	17	16	14	17	15	13	13	13	14	13	16	15	16	22

Assembly																	
Public Order & Safety	Fire station/ police station	41	41	40	38	32	40	36	32	31	32	33	30	38	35	39	52
Public Order & Safety	Other public order and safety	37	38	37	35	29	36	32	29	28	29	30	27	34	32	35	48
Religious Worship	Religious worship	15	15	14	14	12	14	13	11	11	11	12	11	13	13	14	19
Retail (except malls)	Other retail	31	32	31	30	22	30	26	27	25	25	30	26	35	32	38	55
Retail (except malls)	Retail store	18	18	18	17	14	17	15	15	14	14	17	15	20	19	22	31
Retail (except malls)	Vehicle dealership showroom	31	32	31	30	22	31	26	27	25	25	30	26	35	32	38	55
Service	Other service	38	38	37	35	29	37	32	30	28	28	31	29	34	31	36	46
Service	Post office/postal center	27	27	26	25	21	26	23	21	20	20	22	20	24	23	25	34
Service	Repair shop	18	18	18	17	14	17	15	14	13	13	14	14	16	15	17	22
Service	Vehicle service/ repair shop	21	21	20	19	16	20	17	16	15	16	17	16	19	17	20	25
Service	Vehicle storage/ maintenance	9	9	9	8	7	9	8	7	7	7	7	7	8	7	9	11
Warehouse	Distribution/ shipping center	8	10	11	12	6	11	9	12	11	10	16	14	22	18	26	48
Warehouse	Non-refrigerated warehouse	4	5	5	6	3	6	4	6	5	5	8	7	11	9	13	23
Warehouse	Refrigerated warehouse	43	45	45	40	36	45	36	33	35	35	33	30	36	39	40	55
Residential	Multi-family high-rise residential	21	20	17	18	11	18	12	18	16	18	20	17	23	21	24	32

Table 4 - FY2025-FY2029 Maximum Allowable Fossil Fuel-Generated Energy Consumption by Building Category, Building Type and Climate Zone, Commercial Buildings and Multi-Family High-Rise Residential Buildings (source kBtu/yr-sqft)																	
Building Category	Climate Zone:	1	2A	2B	3A	3B Coast	3B Other	3C	4A	4B	4C	5A	5B	6A	6B	7	8
	Building Type	Fossil Fuel-Generated Energy Use Intensity (source kBtu/yr-sqft)															
Education	College/university	20	20	19	18	13	19	16	16	15	16	17	14	20	18	22	32
Education	Elementary/middle school	12	12	12	11	9	11	10	9	9	9	9	8	10	10	11	16
Education	High school	14	14	14	13	10	14	12	12	11	11	13	11	15	13	16	24
Education	Other classroom education	8	8	8	7	5	8	6	7	6	6	7	6	8	7	9	13
Education	Preschool/daycare	16	15	15	14	12	14	13	12	11	11	12	11	13	12	14	20
Food Sales	Convenience store	43	48	46	44	40	47	42	36	38	40	37	34	40	44	44	58
Food Sales	Convenience store with gas	35	38	37	35	32	38	34	29	31	32	30	27	32	36	36	46
Food Sales	Grocery store/food market	36	40	38	36	33	39	35	30	32	34	31	28	33	37	37	48
Food Sales	Other food sales	11	12	12	11	10	12	11	9	10	10	9	9	10	11	11	15
Food Service	Fast food	84	88	89	80	74	90	75	67	72	73	68	63	75	83	83	109
Food Service	Other food service	25	26	26	24	21	27	22	20	21	22	20	19	22	25	25	32
Food Service	Restaurant/cafeteria	45	48	48	43	39	49	41	36	39	40	37	34	41	45	45	59
Inpatient Health Care	Hospital/inpatient health	45	47	48	41	42	47	39	32	33	35	29	27	29	32	30	36
Laboratory	Laboratory	56	56	55	52	44	54	48	44	42	43	45	41	51	48	53	71
Lodging	Dormitory/	13	14	14	14	9	14	13	13	12	13	14	12	17	16	19	26

	fraternity/ sorority																
Lodging	Hotel	16	16	15	15	14	16	15	12	13	13	13	12	14	14	14	17
Lodging	Motel or inn	18	17	17	15	14	16	15	12	12	12	12	11	13	12	12	15
Lodging	Nursing home/ assisted living	26	27	26	24	21	26	23	21	20	20	21	19	24	23	25	34
Lodging	Other lodging	17	16	16	14	13	15	14	11	12	11	11	11	12	12	12	14
Mercantile	Enclosed mall	18	18	18	17	13	17	15	15	14	15	17	15	20	19	22	32
Mercantile	Strip shopping mall	19	19	18	18	13	18	16	16	15	15	18	16	21	20	23	33
Office	Administrative/ profess. office	12	13	13	12	10	12	10	10	10	10	11	9	12	11	13	18
Office	Bank/other financial	18	18	18	17	14	18	15	15	14	14	15	13	17	16	18	25
Office	Government office	16	16	16	15	12	16	13	13	12	12	13	12	15	14	16	22
Office	Medical office (non-diagnostic)	11	11	11	10	8	11	9	9	8	8	9	8	10	9	11	15
Office	Mixed-use office	14	15	15	14	11	14	12	12	11	11	12	11	14	13	15	21
Office	Other office	12	12	12	12	9	12	10	10	9	9	10	9	12	11	12	17
Outpatient Health Care	Clinic/other outpatient health	16	15	16	14	13	15	13	11	11	10	10	10	11	11	10	12
Outpatient Health Care	Medical office (diagnostic)	11	10	10	9	9	10	8	7	7	7	7	7	7	7	7	8
Public Assembly	Entertainment/ culture	7	7	7	7	6	7	6	6	5	6	6	5	7	6	7	9
Public Assembly	Library	19	19	19	18	15	19	17	15	15	15	16	14	18	17	18	24
Public Assembly	Other public assembly	9	9	9	8	7	9	8	7	7	7	7	6	8	8	8	11
Public Assembly	Recreation	8	8	8	8	6	8	7	6	6	6	7	6	8	7	8	11
Public	Social/meeting	9	9	8	8	7	8	7	7	7	7	7	6	8	7	8	11

Assembly																	
Public Order & Safety	Fire station/ police station	21	21	20	19	16	20	18	16	16	16	17	15	19	18	19	26
Public Order & Safety	Other public order and safety	19	19	18	17	15	18	16	15	14	14	15	14	17	16	18	24
Religious Worship	Religious worship	7	7	7	7	6	7	6	6	6	6	6	5	7	6	7	9
Retail (except malls)	Other retail	16	16	16	15	11	15	13	13	12	13	15	13	18	16	19	27
Retail (except malls)	Retail store	9	9	9	9	6	9	8	8	7	7	8	7	10	9	11	16
Retail (except malls)	Vehicle dealership showroom	16	16	16	15	11	15	13	13	13	13	15	13	18	16	19	27
Service	Other service	19	19	19	18	14	18	16	15	14	14	15	15	17	16	18	23
Service	Post office/postal center	13	13	13	12	10	13	12	10	10	10	11	10	12	12	13	17
Service	Repair shop	9	9	9	8	7	9	7	7	7	7	7	7	8	7	8	11
Service	Vehicle service/ repair shop	10	10	10	10	8	10	9	8	8	8	8	8	9	9	10	13
Service	Vehicle storage/ maintenance	4	5	4	4	3	4	4	4	3	3	4	3	4	4	4	6
Warehouse	Distribution/ shipping center	4	5	5	6	3	6	4	6	5	5	8	7	11	9	13	24
Warehouse	Non-refrigerated warehouse	2	2	3	3	1	3	2	3	3	3	4	3	5	4	6	12
Warehouse	Refrigerated warehouse	22	22	23	20	18	22	18	17	17	18	16	15	18	20	20	27
Residential	Multi-family high-rise	11	10	9	9	5	9	6	9	8	9	10	9	11	10	12	16

	residential																
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**PART 435 – ENERGY EFFICIENCY STANDARDS FOR THE DESIGN AND
CONSTRUCTION OF NEW FEDERAL LOW-RISE RESIDENTIAL BUILDINGS**

7. The authority citation for part 435 continues to read as follows:

Authority: 42 U.S.C. 6831–6832; 6834–6836; 42 U.S.C. 8253–54; 42 U.S.C. 7101 *et seq.*

8. In § 435.1, paragraph (b) is added to read as follows:

§ 435.1 Purpose and scope.

* * * * *

(b) This part also establishes a maximum allowable fossil fuel-generated energy consumption standard for new Federal buildings that are low-rise residential buildings and major renovations to Federal buildings that are low-rise residential buildings, for which design for construction began on or after **[DATE ONE YEAR AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]**.

9. In § 435.2:

a. Add in alphabetical order, the definitions of “Combined heat and power (CHP) system,” “Construction cost,” “District energy system,” “Fiscal year (FY),” “Major renovation,” “Power purchase agreement,” and “Renewable energy certificate”;

- b. Revise the definitions of “New Federal building” and “Proposed building”; and
- c. Remove the definitions of “Life-cycle cost” and “Life-cycle cost-effective”.

The additions and revisions read as follows:

§ 435.2 Definitions.

* * * * *

Combined heat and power (CHP) system means an integrated system, located at or near a building or facility, that is used to generate both heat and electricity for use in the building or facility.

Construction cost means all costs associated with design and construction of a building. It includes the cost of design, permitting, construction (materials and labor), and building commissioning. It does not include legal or administrative fees, or the cost of acquiring the land.

* * * * *

District energy system means a central energy conversion plant and transmission and distribution system that provides thermal energy to a group of buildings (heating via hot water or steam, and/or cooling via chilled water). This definition only includes thermal energy systems; central energy supply systems that only provide electricity are excluded from this definition.

* * * * *

Fiscal Year (FY) begins on October 1 of the year prior to the specified calendar year and ends on September 30 of the specified calendar year

* * * * *

Major renovation means changes to a building that provide significant opportunities for compliance with applicable requirements in this part. For subpart B --reduction in fossil fuel-related energy consumption, for example, replacement of the HVAC system, lighting system, building envelope, or other components of the building that have a major impact on energy usage would constitute a major renovation.

New Federal building means any new building (including a complete replacement of an existing building from the foundation up) to be constructed by, or for the use of, any Federal agency. Such term shall include buildings built for the purpose of being leased by a Federal agency, and privatized military housing.

Power purchase agreement means an agreement with an electricity producer for all or a specified portion of the electricity produced from a particular power source, in this case a renewable energy source, for a specified period of time.

Proposed building means the design for construction of a new Federal low-rise residential

building, or major renovation to a Federal low-rise residential building, proposed for construction.

Renewable energy certificate means the technology and environmental (non-energy) attributes that represent proof that 1 megawatt-hour (MWh) of electricity was generated from a renewable energy resource, and can be sold separately from the underlying generic electricity with which it is associated.

§ 435.3 [Amended]

10. Amend §435.3 by adding to the end of paragraph (b)(2) “, 435.201, Appendix A to Subpart B”.

11. Revise § 435.4 to read as follows:

§ 435.4 Life-cycle cost-effective.

Except as specified in subparts A, B or C of this part, Federal agencies shall determine life-cycle cost-effectiveness by using the procedures set out in subpart A of part 436. A Federal agency may choose to use any of four methods, including life-cycle cost, net savings, savings-to-investment ratio, and adjusted internal rate of return using the discount rate published in the annual supplement to the Life Cycle Costing Manual for the Federal Energy Management Program (NIST 85–3273).

12. Subpart B is added to part 435 to read as follows:

Subpart B – Reduction in Fossil Fuel-Generated Energy Consumption

Sec.

435.200 Fossil fuel-generated energy consumption requirement.

435.201 Fossil fuel-generated energy consumption determination.

435.202 Petition for downward adjustment.

Appendix A to Subpart B of Part 435 – Maximum Allowable Fossil Fuel-Generated Energy Consumption

Subpart B — Reduction in Fossil Fuel-Generated Energy Consumption

§ 435.200 Fossil fuel-generated energy consumption requirement.

(a) New Federal buildings. New Federal buildings that are low-rise residential buildings, for which design for construction began on or after **[DATE ONE YEAR AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]**, must be designed to meet the requirements of paragraph (c) of this section if the cost of the building is at least \$2,500,000 (in 2007 dollars, adjusted for inflation).

(b) Major renovations. (1) Major renovations to Federal buildings that are low-rise residential buildings, for which design for construction began on or after **[DATE ONE YEAR AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]**, must be designed to meet the requirements of paragraph (c) of this section if the cost of the major renovation is at least

\$2,500,000 (in 2007 dollars, adjusted for inflation).

(2) This subpart applies only to the portions of the proposed building or proposed building systems that are being renovated and to the extent that the scope of the renovation permits compliance with the applicable requirements in this subpart.

Unaltered portions of the proposed building or proposed building systems are not required to comply with this subpart.

(3) For leased buildings, this subpart applies to major renovations only if the proposed building was originally built for the use of any Federal agency, including being leased by a Federal agency.

(c) Federal buildings that are of the type included in Appendix A of this subpart — (1) Design for construction began during fiscal year 2014 through fiscal year 2029. The fossil fuel-generated energy consumption of the proposed building, based on the building design and calculated according to §435.201(a), must not exceed the value identified in Tables 1-4 of Appendix A of this subpart for the associated building type, climate zone, and fiscal year in which design for construction began.

(2) Design for construction began during or after fiscal year 2030. The fossil fuel-generated energy consumption of the proposed building, based on building design and calculated according to §435.201(a), must be zero.

§ 435.201 Fossil fuel-generated energy consumption determination.

(a) The fossil fuel-generated energy consumption of a proposed design is calculated as follows:

Equation 1: Fossil Fuel-Generated Energy Consumption = $((3.412 \text{ kBtu/kwh} \times \text{Fossil Fuel-Generation Factor} \times (\text{Proposed Building Site Electricity Consumption} - \text{Renewable Energy and CHP Electricity Deduction}) / \text{Electricity Source Energy Factor}) + (\text{Direct Fossil Fuel Consumption of Proposed Building} \times \text{Other Fuels Source Energy Multiplier})) / \text{Floor Area}$

Whereas:

(1) Fossil Fuel-Generation Factor is equal to $(\text{AEP}_{\text{coal}} + \text{AEP}_{\text{pl}} + \text{AEP}_{\text{pc}} + \text{AEP}_{\text{ng}} + \text{AEP}_{\text{og}}) / \text{Total AEP}$

Where

AEP = annual electrical production

pl= petroleum liquids

pc=petroleum coke

ng= natural gas

og = other gas

All values are taken from Table 3.2.A of the EIA Electric Power Annual Report, which is updated on a periodic basis. DOE will on an annual basis calculate the Fossil Fuel Generation Factor and publish the result at the following web address: <http://energy.gov/eere/femp/federal-energy-management-program>

(2) Proposed Building Site Electricity Consumption equals the estimated site electricity consumption of the proposed building calculated in accordance with the Simulated Performance Alternative in Section 405 of the IECC 2009 (incorporated by reference; see § 435.3), measured in kilowatt hours per year (kWh/yr).

(3) Renewable Energy and CHP Electricity Deduction equals the total contribution specified in paragraph (b) of this section, measured in kilowatt hours per year (kWh/yr).

(4) Electricity Source Energy Factor For electricity purchased from the grid, the Electricity Source Factor is equal to 0.316. For on-site electrical generation, it is the estimated efficiency of the generating equipment and any estimated distribution losses that may occur.

(5) Direct Fossil Fuel Consumption of Proposed Building equals the total site fossil fuel consumption of the proposed building calculated in accordance with the Simulated Performance Alternative in Section 405 of the IECC 2009 (incorporated by reference; see § 435.3), excluding fossil fuel consumption for electricity generation, and measured in thousands of British thermal units per year per (kBtu/yr). This includes any fossil fuel consumption attributable to non-electric power (e.g., heat or steam) used in a proposed building that is supplied by a district energy system or CHP system.

(6) Other Fuels Source Energy Multiplier For purposes of Equation 1, the multipliers are as follows:

Natural gas	1.046
Fuel oil	1.00

Propane	1.00
District Steam (non-CHP)	1.35
District steam (CHP)	2.30
District hot water	1.28
Chilled water	1.05
Coal	1.00

(7) Floor Area is the floor area of the structure that is enclosed by exterior walls, including finished or unfinished basements, finished or heated space in attics, and garages if they have an uninsulated wall in common with the house. Not included are crawl spaces, and sheds and other buildings that are not attached to the house.

(b) Renewable energy and CHP electricity deductions — (1) Renewable electricity. The following renewable electricity generation qualifies as a deduction under paragraph (a) of this section to the extent that the renewable electricity generation represents new electric generating capacity or a new renewable energy obligation on the part of the agency, and not a reassignment of existing capacity or obligations:

(i) *On-site renewable electricity generation* is the amount of electricity measured in kilowatt hours per year (kWh/yr) to be consumed by the building that is contributed by renewable electricity generated at the Federal site or facility on which the building will be located. The environmental attributes of the on-site renewable electricity generation must not be transferred.

(ii) *Off-site renewable electricity generation* is the amount of renewable

electricity measured in kilowatt hours per year (kWh/yr) generated at a site or facility, either Federal or non-federal, other than the Federal site or facility on which the building will be located, and may include renewable energy produced under a Power Purchase Agreement and represented by Renewable Energy Certificates.

(2) Limitation on the use of renewable electricity generation for new Federal buildings and major renovations. The environmental attributes of the renewable energy generation must not be transferred. The agency must ensure that the environmental attributes of onsite renewable energy generation are dedicated to meeting the fossil fuel-generated energy consumption reduction requirements of the proposed building.

(3) CHP deduction. Electricity associated with non-electric power provided to a proposed building by a district energy system that is a CHP system or an on-site CHP system qualifies as a deduction under paragraph (a) and is equal to the total heat delivered to the proposed building from the direct energy system divided by total heat produced by the CHP system, times the total electricity produced by the CHP system.

§435.202 Petition for downward adjustment.

(a) New Federal buildings. (1) Upon petition by a Federal agency, excluding the General Services Administration (GSA) but including GSA-tenant agencies with significant control over

building design, the Director of the Federal Energy Management Program may adjust the applicable maximum allowable fossil fuel-generated energy consumption standard with respect to a specific building, upon written certification from the head of the agency designing the building, or the head of a GSA-tenant agency, that the requested adjustment is the largest feasible reduction in fossil fuel-generated consumption that can practicably be achieved in light of the specified functional needs for that building, as demonstrated by:

- (i) A statement sealed by the design engineer that the proposed building was designed in accordance with the applicable energy efficiency requirement in subpart A of this Part, and that each energy consuming product included in the proposed building that is of a product category covered by the ENERGY STAR program or the Federal Energy Management Program for designated products is an ENERGY STAR product or a product meeting the FEMP designation criteria, as applicable;
- (ii) A description of the technologies and practices that were evaluated and rejected, including a justification of why they were not included in the design for construction; and
- (iii) Any other information the agency determines would help explain its request;

(2) The head of the agency designing the building, or the head of a GSA-tenant agency, must also include the following information in the petition:

(i) A general description of the building, including but not limited to location, use type, floor area, stories, and functional needs;

(ii) The maximum allowable fossil fuel-generated energy consumption for the building from Tables 1-4 of Appendix A of this subpart;

(iii) The estimated fossil fuel-generated energy consumption of the proposed building;

(iv) A description of the proposed building's energy-related features, including but not limited to:

(A) Building envelope, including, but not limited to, construction materials, insulation levels, and the type, area, heat loss and solar heat gain and visible light transmission coefficients of windows and other glazing;

(B) HVAC system type and configuration;

(C) HVAC equipment sizes and efficiencies;

(D) Ventilation systems (including outdoor air volume, controls technique, heat recovery systems, and economizers, if applicable);

(E) Service water heating system configuration and equipment (including solar

hot water, wastewater heat recovery, and controls for circulating hot water systems, if applicable);

(F) Lighting technology, interior lighting power, and lighting control techniques;

(G) Estimated process and plug loads; and

(H) Any other energy-related equipment; and

(3) The Director of the Federal Energy Management Program may concur in whole or in part with a petition. Upon concurring in part, the Director of the Federal Energy Management Program will establish an applicable maximum allowable fossil fuel-generated energy consumption standard with respect to a specific building other than the value put forth in the petition.

(4) Petitions for downward adjustment should be submitted to ff-petition@ee.doe.gov, or to:

U.S. Department of Energy
Federal Energy Management Program
Director
Fossil Fuel Reductions in New Federal Buildings
EE-2L
1000 Independence Ave., SW.,
Washington, D.C. 20585-0121

(5) The Director will notify the requesting agency in writing whether the petition for downward adjustment to the numeric reduction requirement is approved, in whole or in part, or rejected, within 90 days of submittal. If the Director rejects the petition or establishes a value other than that presented in the petition, the Director will forward its reasons for rejection to the petitioning

agency.

(b) Major renovations to Federal buildings — (1) Major renovation of the whole building. Upon petition by a Federal agency, excluding the General Services Administration (GSA) but including GSA-tenant agencies with significant control over renovation design, the Director of the Federal Energy Management Program will adjust the applicable maximum allowable fossil fuel-generated energy consumption standard with respect to a specific major renovation of a whole building, upon written certification from the head of the agency designing the building, or the head of a GSA-tenant agency, that the requested adjustment is the largest feasible reduction in fossil fuel-generated consumption that can practicably be achieved in light of the specified functional needs for that building, as demonstrated by a statement stamped by the design engineer that the proposed building was designed consistent with the energy efficiency requirement in subpart A of this Part that corresponds to the date of the proposed building.

(2) Major renovation of a building system or component. Upon petition by a Federal agency, excluding the General Services Administration (GSA) but including GSA-tenant agencies with significant control over renovation design, the Director of the Federal Energy Management Program will adjust the applicable maximum allowable fossil fuel-generated energy consumption standard with respect to a specific major renovation limited to a building system or component, upon written certification from the head of the agency designing the building, or the head of a GSA-tenant agency, that the requested adjustment is the largest feasible reduction in fossil fuel-generated consumption that can practicably be achieved in light of the specified functional needs for that building, as demonstrated by a statement stamped by the design engineer that the

proposed building incorporates commercially available systems and/ or components that provide a level of energy efficiency that is life-cycle cost effective.

(3) Petitions for downward adjustment should be submitted to ff-petition@ee.doe.gov, or to:

U.S. Department of Energy
Federal Energy Management Program
Director
Fossil Fuel Reductions in New Federal Buildings
EE-2L
1000 Independence Ave., SW.,
Washington, D.C. 20585-0121

(4) The downward adjustment for a major renovation will be deemed approved upon submittal of the certification required in paragraphs (b)(1) or (2) of this section, as applicable.

Appendix A to Subpart B of Part 435 – Maximum Allowable Fossil Fuel-Generated Energy Consumption

(a) For purposes of the tables in this Appendix, the climate zones for each county in the United States are those listed in Figure 301.1 of IECC 2009 (incorporated by reference; see §435.3).

(b) For purpose of Appendix A, the following definitions apply:

Manufactured Home means a dwelling unit built to the Federal Manufactured Home Construction and Safety Standards in 24 CFR part 3280, that is built on a permanent chassis and moved to a site. It may be placed on a permanent or temporary foundation and may contain one or more rooms.

Multi-Family in 2-4 Unit Buildings means a category of structures that is divided into living quarters for two, three, or four families or households in which one household lives above or beside another. This category also includes houses originally intended for occupancy by one family (or for some other use) that have since been converted to separate dwellings for two to four families.

Multi-Family in 5 or More Unit Buildings means a category of structures that contain living quarters for five or more households or families and in which one household lives above or beside another.

Single-Family Attached means a building with two or more connected dwelling units, generally with a shared wall, each providing living space for one household or family. Attached houses are considered single-family houses as long as they are not divided into more than one dwelling unit and they have independent outside entrances. A single-family house is contained within walls extending from the basement (or the ground floor, if there is no basement) to the roof. Townhouses, row houses, and duplexes are considered single-family attached dwelling units, as long as there is no dwelling unit above or below another. This includes modular homes but does not include manufactured homes.

Single-Family Detached means a separate, unconnected dwelling unit, not sharing a wall with any other building or dwelling unit, which provides living space for one household or family. A single-family house is contained within walls extending from the basement (or the ground floor, if there is no basement) to the roof. This includes modular homes but does not include manufactured homes.

Table 1 – FY2013-FY2014 Maximum Allowable Fossil Fuel-Generated Energy Consumption by Building Category, Building Type and Climate Zone, Residential Buildings (source kBtu/yr-sqft)																	
Building Category	Climate Zone:	1	2A	2B	3A	3B Coast	3B Other	3C	4A	4B	4C	5A	5B	6A	6B	7	8
	Building Activity/ Type	Fossil Fuel-Generated Energy Use Intensity (source kBtu/yr-sqft)															
Residential	Mobile/ manufactured	56	54	46	48	28	47	33	48	43	49	53	45	61	54	64	84

	home																
Residential	Single-family detached	42	40	34	36	21	35	24	36	32	36	39	33	45	40	47	62
Residential	Single-family attached	48	46	39	41	24	40	28	41	37	41	45	38	52	46	55	72
Residential	Multi-family (in 2-4 unit building)	70	68	57	60	35	59	41	60	54	61	66	56	76	68	80	105
Residential	Multi-family (in 5+ unit building)	48	46	39	41	24	40	28	41	37	41	45	38	52	46	55	72

Table 2 – FY2014-FY2019 Maximum Allowable Fossil Fuel-Generated Energy Consumption by Building Category, Building Type and Climate Zone, Residential Buildings (source kBtu/yr-sqft)																	
Building Category	Climate Zone:	1	2A	2B	3A	3B Coast	3B Other	3C	4A	4B	4C	5A	5B	6A	6B	7	8
	Building Activity/ Type	Fossil Fuel-Generated Energy Use Intensity (source kBtu/yr-sqft)															
Residential	Mobile/ manufactured home	44	42	35	37	22	36	25	37	34	38	41	35	47	42	50	65
Residential	Single-family detached	32	31	26	28	16	27	19	28	25	28	30	26	35	31	37	49
Residential	Single-family attached	37	36	30	32	18	31	22	32	29	32	35	30	40	36	42	56
Residential	Multi-family (in 2-4 unit building)	55	53	44	47	27	46	32	47	42	47	51	44	59	53	62	82
Residential	Multi-family (in 5+ unit building)	37	36	30	32	18	31	22	32	29	32	35	30	40	36	42	56

Table 3 – FY2020-FY2024 Maximum Allowable Fossil Fuel-Generated Energy Consumption by Building Category, Building Type and Climate Zone, Residential Buildings (source kBtu/yr-sqft)																	
Building Category	Climate Zone:	1	2A	2B	3A	3B Coast	3B Other	3C	4A	4B	4C	5A	5B	6A	6B	7	8
	Building Activity/ Type	Fossil Fuel-Generated Energy Use Intensity (source kBtu/yr-sqft)															
Residential	Mobile/ manufactured home	25	24	20	21	12	21	15	21	19	22	23	20	27	24	28	37
Residential	Single-family detached	18	18	15	16	9	15	11	16	14	16	17	15	20	18	21	28
Residential	Single-family attached	21	21	17	18	11	18	12	18	16	18	20	17	23	21	24	32
Residential	Multi-family (in 2-4 unit building)	31	30	25	27	15	26	18	27	24	27	29	25	34	30	36	47
Residential	Multi-family (in 5+ unit building)	21	20	17	18	11	18	12	18	16	18	20	17	23	21	24	32

Table 4 – FY2024-FY2029 Maximum Allowable Fossil Fuel-Generated Energy Consumption by Building Category, Building Type and Climate Zone, Residential Buildings (source kBtu/yr-sqft)																	
Building Category	Climate Zone:	1	2A	2B	3A	3B Coast	3B Other	3C	4A	4B	4C	5A	5B	6A	6B	7	8
	Building Activity/ Type	Fossil Fuel-Generated Energy Use Intensity (source kBtu/yr-sqft)															
Residential	Mobile/ manufactured home	12	12	10	11	6	10	7	11	10	11	12	10	13	12	14	19
Residential	Single-family detached	9	9	8	8	5	8	5	8	7	8	9	7	10	9	11	14
Residential	Single-family attached	11	10	9	9	5	9	6	9	8	9	10	9	12	10	12	16
Residential	Multi-family (in 2-4 unit building)	16	15	13	13	8	13	9	13	12	14	15	13	17	15	18	23
Residential	Multi-family (in 5+ unit building)	11	10	9	9	5	9	6	9	8	9	10	9	11	10	12	16

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